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5. Letters to the Editor on important research problems.

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Creativity, Intelligence and Achievement

Some Findings of Recent Research

Baqer Mehdi

This paper discussed the nature of divergent thinking and convergent thinking in relation to intelligence and school achievement. It examines significant research in the area and the various measures of creativity devised.

Perhaps the most significant contribution of the last two decades of research on the structure of human abilities is the growing emphasis now given to creativity as a subject for empirical study. The now-too-well-known researches of Guilford and his associates at the University of California on the structure of Intellect (1950, 1956) have brought to the fore the existence of two distinct types of thinking abilities, namely, convergent thinking and divergent thinking, the former involving the generation of ideas and facts from known information, the latter pertaining to new ideas or data which minimally depend on known information. In terms of the end results, convergent thinking implies a 'single already ascertained right response', whereas divergent thinking results in a 'variety of responses involving fluency, flexibility, originality and elaboration'. With the distinction thus made, convergent thinking came to be identified with intelligence as usually defined and measured by the well-known intelligence tests, while divergent thinking gave

the most obvious indication of what is generally understood by the term 'creativity'.

In his later writings, Guilford (1957, 1959) redesignated the components of creative thinking and included within its fold not only divergent production abilities, but also redefinition abilities of the convergent production category and sensitivity to a problem which falls in his evaluation category. Thus a great number of thinking abilities are now designated as involved in creativity. According to Guilford, these may be enumerated as follows: (1) Sensitivity to a problem (seeing defects, needs, deficiencies; seeing the odd, the unusual; seeing what needs to be done); (2) figural spontaneous flexibility; (3) figural adaptive flexibility; (4) word fluency; (5) expressional fluency; (6) semantic spontaneous flexibility; (7) ideational fluency; (8) associational fluency; (9) originality; (10) semantic elaboration; (11) figural redefinition; (12) semantic redefinition; (13) symbolic redefinition.

A number of tests have since been prepared by Guilford, Torrance, Getzels and Jackson and others in an attempt to measure creativity as a new dimension in the intellectual domain. While Guilford's tests can best be described as factor tests, Torrance and Getzels and Jackson constructed their batteries with a view to developing complex tasks presumed to involve the creative process. The responses were scored for several types of thinking or factors such as fluency, flexibility, originality, and elaboration. Getzels and Jackson (1962) used five different measures of creativity in their research. Some of the ideas were borrowed from Guilford, while others were their own. The measures used were: (1) Word Association (a test in which the subject is required to give as many definitions as possible of a fairly common word such as 'bolt' or 'sack'; (2) Uses of things (a test in which the subject gives as many uses as he can for a common object, such as a brick or a toothpiece); (3) Hidden shapes test (a test in which the subject is shown a card with a simple geometric figure on it and is required to find this figure hidden in a more complex form or pattern); (4) Fables test (a test in which the subject is presented with short fables from which the last line is missing. The subject is required to compose three different endings for each fable, a 'moralistic' one, a 'humorous'

one, and a 'sad' one); (5) Make-up problem (a test in which the subject is presented with a number of complex paragraphs. Each paragraph contains many numerical statements, and the subject is required to make up as many mathematical problems as he can with the information given. The score on the above test depends upon the number, appropriateness, variety, and originality of the responses).

Coming to Torrance's battery we find that the assessment devices involve both verbal and figural materials. The verbal tasks include such devices as a three-part Ask-and-Guess Test, Product Improvements, Unusual Uses, Unusual Questions, Impossibilities and the 'Just Suppose' Activity, while the figural tasks include Picture Construction, Incomplete Figures and Parallel Lines or Circles and Squares. The battery has two parallel forms and is too long and detailed to be described here. What is important for us to note is that all of the tasks call for the production of divergent solution, multiple possibilities and some type of thinking theoretically involved in creative behaviour. The responses are scored for fluency, flexibility, originality and elaboration.

Creativity and Intelligence

A natural question arising out of the special efforts to measure creativity as an independent dimension in the intellectual domain is with regard to its relationship with intelligence which is supposed to underlie all mental activities. Earlier researches on mental abilities had indicated that even when independent group factors instead of one 'g' factor and a few other small group factors were hypothesised the factors themselves were found to be so significantly inter-correlated that the correlations could not be explained by chance alone and a 'second order factor', by whatever name we may call it, had to be conceded. Now what relationship exists between creativity and intelligence when the two seem to be so clearly distinguishable? The one obvious thing which has been noted in the real life situation is that those who make creative contribution to the development of society are not necessarily those who are highly intelligent. As Thurstone wrote in 1952: "To be extremely in-

telligent is not the same as to be gifted in creative work." It seemed then that men who made creative contribution in their own fields, be it art, science, literature or mechanical, differed in some significant way from those that could be designated as highly intelligent. Empirical evidence supported this observation. Dearborn (1898) studies the imaginative responses of Harvard students and faculty to a series of inkblots. He found that some of the students who were decidedly of the intellectual type gave a very poor account of themselves on imaginative thinking. Colvin and Meyer (1906) found that 'logical power' shows no pronounced relation to any type of imagination except the visual. Laure Chassell (1916) working with a number of different tests involving both convergent and divergent types of thinking found that "performance on the IQ tests have relatively little relation to performances on creativity tests". (Getzels and Jackson, 1962). Elizabeth Andrews (1930), McCloy and Meier (1931), Welsh (1945), and Thurstone (1953) arrived at the same results. Writing in the early fifties, Thurstone repeatedly asserted that creative thinking ability could not be equated with intelligence.

These early studies though highly suggestive could not point to the exact nature of the relationship between intelligence and creativity. What after all were the basic cognitive components of creativity and what statistical evidence was needed in order to demonstrate clearly a dimension of thinking within the intellectual domain which would stand apart from the now-too-well-known and universally accepted dimension, namely, intelligence. Factor analysis alone could not provide the solution; nor could this be determined by merely combining a few psychological tests of statistically differentiable psychological factors that seemed to be relevant on an *a priori* definition of creativity and then showing that they correlated rather low with tests of intelligence. Many studies in the later fifties and early sixties adopted this approach in order to demonstrate the distinction between creativity and intelligence. But as Wallach and Kogan (1965) have argued,

the warrant for claiming an empirically separable divergent thinking domain depends—once the matter of face validity is taken care of—upon showing that the divergent thinking tasks share a substantial amount of variance in common, that they share substantially less

variance with convergent thinking tasks than they share with one another, and that the measures of convergent thinking share a substantial amount of variance in common as well (Wallach, 1970)

After all, in the absence of clear external validating criteria of creativity (and certainly there is no one type of creativity) our primary empirical ground for defending the separate status of divergent thinking abilities so closely linked with creativity rests upon their distinguishability from conventional intelligence measures. The final answer as to the nature of creativity in a certain field will of course depend on the validation studies based on the use of external criteria. Commonsense, however, would suggest that some minimum level of intelligence would be needed in order to be creative whatever to be the field. This level might differ from one field to another. Thus perhaps the role of intelligence would be more prominent in scientific creativity than in creativity in the arts. Similarly a higher level of intelligence would perhaps be needed for creative writing than for, say, creative performance in music, dance, and drama. In this connection John Anderson's (1960) concept of ability gradient should be useful. According to this concept, ability level can be thought of in terms of thresholds, meaning thereby that a minimum level may be considered necessary to carry on a task, but beyond that level there would be other factors that would determine performance in that task. It may be worth mentioning here that creativity when considered in terms of performance (product) is not the same thing as creativity when considered in terms of potential or process. Creative performance in a certain field requires not only the ability to think creatively but also a host of other abilities and personal qualities besides a minimum level of general mental functioning commonly designated as intelligence. It is no wonder then that MacKinnon and Barron (1969) in their researches on highly creative adults at the Institute of Personality Assessment and Research have found differential contribution of intelligence in different fields.

Returning to our major question regarding the exact nature of relationship between intelligence and creativity, Wallach and Kogan (1965) have pointed out that the main issue involved here is how we define creativity. If we define creativity in terms of product then

naturally we will have to broadbase our definition so as to include in it a variety of mental and personality traits which may or may not be correlated with each other. On the other hand, if we define creativity in terms of a thinking process which is distinguishable from other mental processes then naturally we will have to limit it to only those functions which distinguish it from other traits. From the point of view of measurement, it is the latter approach which seems more defensible. In this connection Wallach and Kogan (1965) suggest an associational concept of creativity consisting of two variables, namely, the total number of associations of which a person is capable and the relative uniqueness of his association process. They take Mednick's (1962) definition of creative thinking, namely, "...the forming of associative elements into new combinations which either meet specified requirements or are in some way useful". Taking this definition as their starting point they devised procedures which emphasised the person's ability to generate a large number of ideas, in response to a given task requirement and his ability to produce, in response to that task, mainly ideas that could be considered as unique. The results of their study lent strong support for Mednick's formulation and also confirmed the indication from earlier work that "ideational fluency and fluency-dependent forms of uniqueness are maximally orthogonal to convergent thinking skill". (Wallach, 1970)

Reviewing a large number of studies based on the measurement of creativity by means of Guilford's, Torrance's, and Getzels and Jackson's tests they could show that what these tests measured did not conform to any single recognisable dimension distinct from intelligence. When they analysed the correlations of divergent thinking measures with intelligence measures alongside the correlations among divergent thinking measures themselves, the picture that emerged again and again was that the divergent measures correlated among themselves to more or less the same extent (the correlations ranging from .20 to .40) as they correlated with measures of intelligence. From this they concluded that "the divergent thinking measures have little variance in common apart from variance that they also share with the convergent thinking domain". It would seem then that the extent of relationship between IQ and measured

creativity depends among other things on the nature of tests employed. Of course, there would be a number of factors that would account for the size of correlations obtained. Restriction of range, for example, may be one such factor. Many reports of limited relationship between creativity and intelligence have been made by generalising from samples containing a restricted range of both intelligence and creativity. In the now oft-quoted study of Getzels and Jackson (1962) a sample of 292 boys and 241 girls were used. The mean IQ for this initial sample as a whole was 132. Getzels and Jackson found that for the boys, the average correlation among the five creativity measures was .28 but it was .26 between those measures and IQ. For the girls, the corresponding correlations were .32 and .27. As will be seen, the correlation between the two variables is low but positive. That it is positive and significant is due to the fact that the so-called tests of divergent thinking used in the creativity battery jointly measure the same kind of ability that is indexed by the IQ assessors. The same appears to be true for Guilford's and Torrance's batteries as well. From a study of better high school students (Upper 1%), it has been estimated that intelligence has little or no relationship to creative performance in arts and science (Holland, 1961). An empirical demonstration of the possible effect of restriction of range of IQ, has been reported by Ripple and May (1962). They correlated Otis IQ's and scores on creative thinking tests administered to several seventh grade groups both homogeneous and heterogeneous in respect of their IQ's and found that the coefficients of correlation for homogeneous group were significantly smaller than for the heterogeneous group. When a carefully chosen sample of 7,648 fifteen-year-old boys and girls in Project Talent was investigated for correlation between IQ and creativity, Shycoft and others (1963) reported a correlation of .67. This becomes .80 when corrected for attenuation (McNemer, 1964).

The nature and size of the relationship thus remains speculative. Much depends on the type of tests used and the nature of the sample studied. As pointed out by Telford and Sawrey (1967), "Creativity of certain kinds may be highly related to intelligence. That some intelligence is essential for the production of cultural, scientific, technological or artistic innovation would appear obvious".

Creativity and School Achievement

An interesting aspect of research on creativity has been the study of its relationship with achievement in school. The findings of Getzels and Jackson (1958) and later of Torrance (1960) that the creative thinking abilities are apparently as important as those measured by traditional measures of IQ in educational achievement have only tended to confuse the issue. Flescher (1963) has, however, tried to clarify it in a recent study in which the validity of implications concerning the comparative influence of unusual creative thinking and exceptional intelligence in the learning process has been thoroughly studied. In an elaborately designed study in which the two groups left out by the earlier researches, one characterised by non-extraordinary intelligence and creativity and the other by high creativity and high intelligence were also used. Flescher found, as he should have found, that while there existed a significant relationship between intelligence and scholastic performance, creativity was not related to academic success. That Getzels and Jackson and Torrance did find a substantial relationship can be easily explained by the fact that they were concerned with those pupils in the creativity groups, who possessed sufficiently high intelligence, considerably above 120. To be more exact, the mean IQ of the 'high IQ' group was 150, whereas the mean IQ of the 'high creative' group was 127. It is clear that the high creative group was still pretty bright and no wonder was quite high in academic achievement. Once the intelligence of the high creatives fell below 120 the mean achievement scores of the high creative group fell significantly below those of the high IQ group. An important point which has to be kept in mind when considering the relationship between creativity and achievement is the nature of the creativity tests used and also the nature of the achievement taken as the criterion. The question to be asked about the creativity tests is whether they represent a dimension in the intellectual domain which is separate and distinct from intelligence. As for the achievement criterion, we will have to see what type of achievement criterion has been used. Certainly we should not expect any sizable correlation between creativity and achievement, if the latter emphasises convergent type of learning and is measured by convergent type of

tests. In order to show that creativity and school achievement are highly correlated we will have to restrict our attention to divergent type of achievement only. It is futile to expect a measure of divergent thinking to correlate highly with convergent type of achievement. Once more we are led to the conclusion that in order to explain a correlation between two measures the variances involved in the two must be considered before making any generalisation.

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Developmental Trends in the Dimensions of Cooperative and Competitive Game Behaviour in Some Sub-Cultures

Udai Pareek

Debadatta Banerjee

The authors report a study of Cooperative and Competitive Behaviour in Class IV, VI and VIII boys and girls from Delhi and from Udaipur Hindus, Bohras, Bhils and Minus. A Maximising Differences Game (MDG), devised by McClintock and Nuttin (1969), was used to study the following variables: trust, trustworthiness, repentance, retaliation, forgiveness, exploitation.

Cooperative and competitive behaviour was studied using a Maximising Differences Game (MDG), devised by McClintock and Nuttin (1969), which is a mixed motive game. The procedure of the game and scoring are described elsewhere (Pareek and Banerjee, unpublished). The game is played in a dyad situation, and each player makes 100 moves, giving either a cooperative (C) or a com-

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petitive or defecting (D) response. The developmental trends in cooperative (C) and competitive (D) responses are discussed elsewhere (Pareek and Banerjee, unpublished). Other than these two variables, six other variables were also qualitatively analysed on the basis of the sequence of interaction between two Ss. Those variables were Trust, Trustworthiness, Repentance, Retaliation, Forgiveness, and Exploitation. These variables were defined by Rapoport and Chammanah (1965) as follows:

1. *Trust*—'A' choosing C after both he and 'B' chose D (T).
2. *Trustworthiness*—If both players choose cooperative (C) on the first interaction, 'A' has chosen C on the second interaction, then 'A' has demonstrated trustworthiness (Tr).
3. *Forgiveness*—If 'A' chooses C after he chose C and 'B' chose D, then 'A' demonstrates forgiveness (F).
4. *Repentance*—'A' choosing C after having chosen D when 'B' chose C, then 'A' shows repentance (R).
5. *Retaliation*—'A' choosing D after having chosen C when 'B' chose D, then 'A' shows retaliation (Re).
6. *Exploitation*—When 'A' defects in the second trial after choosing C by both the Ss, in the first trial (E).

The present paper reports developmental trends in these six dimensions of cooperative and competitive behaviour. The details of the sample used in the study are given in Table 1.

RESULTS

Trust

One of the most important factor which works in cooperation-competition game is trust. The person, who cooperates in MDG also trusts that the other person will also cooperate with him. In MDG, trust is scored when in first trial both the players defect. But knowing that the partner defected in the previous trial, S (or Ss) cooperates in the following trial, it shows that he is showing trust towards the partner, and expecting that the other person will also cooperate with him.

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TABLE 1
*Area wise, Class-wise, and Sex-wise ** Details of Total Sample*

Area Class	B	G	C-B	C-G	Total		Grand Total
					B	G	
Delhi							
IV	20	20	20	20	40	40	80
VI	20	20	20	20	40	40	80
VIII	20	20	20	20	20	40	80
Udaipur Hindu							
IV	10	10	10	10	20	20	40
VI	10	10	10	10	20	20	40
VIII	10	10	10	10	20	20	40
Udaipur Bohra							
IV	10	10	—	—	10	10	20
VI	10	10	—	—	10	10	20
VIII	10	10	—	—	10	10	20
*Udaipur Bhil							
IV	—	—	—	—	—	—	—
VI	—	10	—	—	—	10	10
VIII	—	10	—	—	—	10	10
*Udaipur Mina							
IV	—	—	—	—	—	—	—
VI	—	10	—	—	—	10	10
VIII	—	4	—	—	—	4	4
Grand Total	120	154	90	90	210	244	454

*Number of subjects covered from Bhil and Mina Tribes was not adequate; therefore, for most of the comparisons these two groups were combined together under the heading of Udaipur Tribes and in that case N will be Tribal Class VI G=20, and Class VIII G=14.

**B=Boys,

G=Girls,

C- Mixed group

Table 2 shows that maximum trust was shown by Tribal Class VIII students (N=17.21) and lowest trust was shown by Tribal Class VI Ss (M=7.35). When means of different classes were compared on the basis of different sample groups it was found that Tribal Class VI Ss showed significantly lesser trust in comparison to other three sample groups (Delhi, Hindu, and Bohra) and values in all these cases were significant at .01 level. Though Tribal Class VIII students secured highest scores in trust, they did not differ significantly from the Class VIII Ss of the other sample, except

Bohra Class VIII Ss, in which t value between two means was found to be significant at .05 level.

Examining the group-wise as well as community-wise sample (Table 2) we found that highest trust was shown by Delhi Ss ($N=14.66$), the next highest by Hindu Ss and the lowest was shown by Tribal Ss ($N=10.88$). Mean differences calculated between Tribes and Delhi Ss as well as Hindu Ss were found to be significant at .05 level.

Some trends in the development of trust are seen in Table 3 which shows class-wise comparison in each sample. In Delhi and Bohra Ss, it was noticed that degree of trust increased with age, but mean differences were not found statistically significant between three classes. In Hindu Ss only Class IV Ss differed significantly

TABLE 2
Group-wise Mean Differences on Trust

CLASS	IV		VI		VIII		TOTAL	
Groups	Mean t value		Mean t value		Mean t value		Mean t value	
Delhi	13.00		15.77		15.85		14.06	
Hindu	11.97	1.017	16.02	0.172	16.17	0.167	14.60	N.S.
Delhi	13.60		15.77		15.35		14.06	
Bohra	10.15	1.717	13.95	1.247	11.95	1.618	11.32	N.S.
Delhi			15.77		15.85		14.06	
Tribe			7.35	4.929**	17.21	0.485	10.88	2.423*
Hindu	11.97		16.02		16.17		14.50	
Bohra	10.15	0.688	13.05	1.094	11.95	1.744	11.32	N.S.
Hindu			16.02		16.17		14.50	
Tribe			7.35	3.981**	17.21	0.376	10.88	2.068*
Bohra			13.05		11.95		11.32	
Tribe			7.35	3.065**	17.21	2.314*	10.88	N.S.

* t value significant at .05

** t value significant at .01

from Class VI Ss at .05 level of significance, and Tribal Class VI Ss were shown less trust than Class VIII Ss, which was significant at .01 level. But only Bohra Class VIII Ss have shown a peculiar trend,

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TABLE 3
Development of Trust in Different Communities

Groups	DELHI		HINDU		BOHRA		TRIBE	
Class	Mean	t Value	Mean	t Value	Mean	t Value	Mean	t Value
IV	13.60		11.97		10.15		—	
VI	15.77	1.907	10.02	1.996*	13.05	1.323	—	
IV	13.60		11.97		10.15		—	
VIII	15.85	1.580	10.17	1.953	11.95	0.667	—	
VI	15.77		10.02		13.05		7.35	
VIII	15.85	0.054	10.17	0.073	11.95	0.807	17.21	4.470**

*t value significant at .05

**t value significant at .01

i.e., they scored less in trust than Class VI Ss, although the difference was not found significant.

TABLE 4
Age Differences in Trust (T)

Groups	DELHI		HINDU		BOHRA		TRIBE	
Class	Mean	t Value	Mean	t Value	Mean	t Value	Mean	t Value
IV B	10.25		10.00		11.10		—	
VI B	16.75	0.235	13.50	0.987	12.00	0.026	—	
IV B	10.25		10.00		11.10		—	
VIII B	10.65	0.099	12.80	0.744	11.60	0.184	—	
VI B	16.75		13.50		12.00		—	
VIII B	10.65	0.025	12.80	0.175	11.60	0.496	—	
IV G	12.95		13.00		9.20		—	
VI G	15.85	1.583	15.30	0.350	14.40	1.095	—	
IV G	12.95		13.60		9.20		—	
VIII G	13.00	0.022	18.90	0.988	12.30	0.023	—	
VI G	15.85		15.30		14.40		7.35	
VIII G	13.00	1.405	18.00	0.790	12.30	0.216	17.21	4.470**
IV C	12.60		12.15		—		—	
VI C	15.25	1.453	17.05	1.863	—		—	
IV C	12.60		12.15		—		—	
VIII C	10.87	2.521*	10.50	0.711	—		—	
VI C	15.25		17.05		—		—	
VIII C	10.87	0.983	16.50	0.396	—		—	

*t value significant at .05

**t value significant at .01

B=Boys, G=Girls

C=Combined pairs

Age differences in boys, girls or combined group on trust can be seen in Table 4 which, in addition to the above-mentioned results, shows that in Delhi group, Class VIII combined group showed more trust than Class IV combined group, and the mean difference was found to be significant at .05 level.

When t values were computed to find the sex differences on trust in different samples, it was found that no statistically significant difference was observed between pure boys and girls groups of three classes, but only in Delhi sample Class VIII girls showed less trust than the Class VIII combined group and the difference was found to be statistically significant at .05 level (Table 5).

TABLE 5
Sex Differences in Trust (T)

Groups	DELHI		HINDU		BOHRA	
Class	Mean	t Value	Mean	t Value	Mean	t Value
IV B	16.25		10.00		11.10	
IV G	12.95	1.579	13.60	0.783	9.20	0.408
VI B	16.75		12.15		12.90	
VI G	12.95	0.480	13.50	0.404	14.10	0.496
VIII B	16.65		17.05		11.00	
VIII G	13.00	0.883	12.80	1.308	12.30	0.216
IV C	12.60		12.15		—	
IV B	16.25	1.702	10.00	0.016	—	
IV C	12.60		12.15		—	
IV G	12.95	0.164	13.00	0.350	—	
VI C	15.25		15.30		—	
VI B	16.75	0.721	12.15	1.217	—	
VI C	15.25		15.30		—	
VI G	15.85	0.307	13.50	0.081	—	
VIII C	16.87		18.00		—	
VIII B	16.65	0.074	17.05	1.015	—	
VIII C	16.87		18.00		—	
VIII G	13.00	2.010*	12.80	0.614	—	

*t value significant at .05

**t value significant at .01

B=Boys,

G=Girls,

C=Combined pairs

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Repentance

In this situation, a person repents or feels bad for his own behaviour towards his partner, and changes his behaviour from competitive to cooperative, only knowing that in the previous trial his partner cooperated with him when he himself competed or defected from his partner. From Table 6 it is clear that Bohra on the whole showed less repentance ($M=7.13$), and in contrast to that Hindu showed high repentance ($M=11.17$).

TABLE 6
Group-wise Mean Differences in Repentance (R)

CLASS	IV		VI		VIII		TOTAL	
Groups	Mean	t Value	Mean	t Value	Mean	t Value	Mean	t Value
Delhi	12.30		9.55		8.37		10.09	
Hindu	11.77	0.378	14.05	2.413*	7.70	0.554	11.17	N.S.
Delhi	12.30		9.55		8.37		10.09	
Bohra	5.95	3.302**	9.75	0.132	5.70	1.645	7.13	3.083**
Delhi	—		9.55		8.37		10.09	
Tribe	—		9.35	0.123	9.78	0.720	9.53	N.S.
Hindu	11.77		14.05		7.70		11.17	
Bohra	5.95	2.080**	9.75	1.234	5.70	1.305	7.13	2.900**
Hindu	—		14.05		7.70		11.17	
Tribe	—		9.75	1.310	9.78	1.138	9.53	N.S.
Bohra	—		9.75		5.70		7.13	
Tribe	—		9.35	0.153	9.78	1.851	9.53	N.S.

*t value significant at .05

**t value significant at .01

When two groups were compared according to classes it was noted that Class IV Bohra *Ss* showed significantly lesser repentance ($P < .01$) than Delhi Class IV *Ss*, and Class IV Hindu *Ss*. Among Class VI *Ss*, Delhi *Ss* showed less repentance than Hindu ($P < .05$). No difference was found significant between different areas for Class VIII *Ss*.

When group-wise total sample was taken for comparison, it was found that Bohra *Ss* showed significantly less repentance than Delhi and Hindu *Ss*, and the difference was significant at .01 level for both the cases.

As a developmental phenomenon it was found that the degree of repentance was shown more by younger *Ss* than the elder *Ss*. It

is clear from Table 7 that in Delhi, Class IV Ss showed less repentance from Class VI and VIII and the differences were found to be significant at .05 level. But no significant difference was found between Class VI and VIII Ss. In Hindu Ss, only difference between Class IV and Class VI Ss was not found significant, other *t* values between means of Class IV and Class VIII as well as Classes VI and VIII were found to be statistically significant at .05 level. Among other two sample groups no mean difference was found significant, which in a way shows that so far as this behavioural pattern was concerned, Ss of different classes did not differ from each other and the tendency of repentance was not developed in those Ss (Bohra and Tribes) in the same pattern as it was developed in other two sample groups.

TABLE 7

Development of Repentance (R) in Different Communities

GROUPS	DELHI		HINDU		BOHRA		TRIBES	
Class	Mean t Value		Mean t Value		Mean t Value		Mean t Value	
IV	12.86	2.583*	11.77	0.855	5.95	1.054	—	
VI	9.55		14.05		9.75			
IV	12.86	2.454*	11.77	2.698*	5.95	0.121	—	
VIII	8.37		7.70		5.70			
VI	9.55	1.199	14.05	2.507*	9.75	1.937	9.35	0.15
VIII	8.37		7.70		5.70		9.78	

*t value significant at .01

**t value significant at .01

As for age differences among boys, girls and combined groups of each group and community were concerned, it was found (Table 8) that in Delhi sample Class IV boys showed high repentance than Class VI and Class VIII boys (*t* values were significant at .05 level) and among girls only Class IV girls showed more repentance than Class VIII girls. Though differences were not statistically significant, a trend was noted for Delhi Ss that repentance decreased as age increased. In Hindu Ss only Class IV boys and Class VIII boys, and Class VI and Class VIII boys differed significantly (at .05 and .01 level of significance, respectively). No other *t* values between girls groups or combined groups were found to be significant

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for this particular community. From Bohra Ss, only girls of Class IV differed significantly from Class VI girls and Class VIII girls and both the *t* values were significant at .01 level.

TABLE 8
Age Differences in Repentance (R)

GROUPS	DELHI		HINDU		BOHRA		TRINE	
Class	Mean t Value		Mean t Value		Mean t Value		Mean t Value	
IV B VIB	12.75 8.15	2.555*	9.70 11.00	0.344	8.70 7.90	0.221	—	
IV B VIII B	12.75 7.50	2.282*	9.70 4.00	2.241*	8.70 8.00	0.194	—	
VIB VIII B	8.15 7.50	0.320	11.00 4.00	2.176**	7.90 8.00	0.030	—	
IV G VIG	15.45 11.75	1.496	12.40 21.30	0.985	3.20 11.60	3.022**	—	
IV G VIII G	15.45 8.25	2.710*	12.40 6.50	1.883	3.20 3.40	0.116		
VIG VIII G	11.75 8.25	1.730	21.30 6.50	1.725	11.60 3.40	3.311**	9.35 9.78	0.150
IV C VIC	10.62 9.15	0.963	12.50 11.95	0.221	—		—	
IV C VIII C	10.62 8.87	1.150	12.50 10.15	0.978	—		—	
VIC VIII C	9.15 8.87	0.201	11.95 10.15	0.874	—		—	

*t value significant at .05

**t value significant at .01

B=Boys,

G=Girls,

C=Combined pairs

TABLE 9
Sex Differences in Repentance (R)

GROUPS	DELHI		HINDU		BOHRA	
Class	Mean t Value		Mean t Value		Mean t Value	
IV B	12.75		9.70		8.70	
IV G	15.45	1.040	12.40	0.718	3.20	1.704
VIB	8.15		11.00		7.00	
VI G	11.75	2.226*	21.30	1.139	11.00	1.112
VIII B	7.50		4.00		8.00	
VIII G	8.25	0.316	6.50	1.703	3.40	1.840
IV C	10.62		12.50		—	
IV B	12.75	1.038	9.70	0.800	—	
IV C	10.62		12.50		—	
IV G	15.45	2.150*	12.40	0.029	—	
VIC	9.15		11.95		—	
VI B	8.15	0.641	11.00	0.315	—	
VI C	9.15		11.95		—	
VI G	11.75	1.584	21.30	1.483	—	
VIII C	8.87		10.15		—	
VIII B	7.50	0.748	4.00	2.884	—	
VIII C	8.87		10.15		—	
VIII G	8.25	0.355	6.50	1.750	—	

*t value significant at .05

**t value significant at .01

B=Boys,

G=Girls,

C=Combined pairs

When *t* values were calculated to find out sex differences in each class (area-wise), a very few *t* values were found to be significant (Table 9), Delhi Class VI girls showed more repentance than Class VI boys ($P < .05$) and Class IV girls showed more repentance than Class IV combined group. In Hindu sample, Class VIII boys showed significantly less repentance than Class VIII combined group, and *t* value was significant at .01 level.

Retaliation

Retaliation as opposite of repentance is scored in the maximising difference game, when a person defects from (competes with) the other, knowing that in previous trial his partner defected from

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him when he cooperated with his partner, or in other words it can be said that a person defects just to take revenge.

Group-wise mean in Table 10 shows that highest amount of retaliation was shown by Hindu Ss and lowest retaliation was shown by Tribal Ss.

TABLE 10
Group-wise Mean Differences in Retaliation (Rs)

CLASS	IV		VI		VIII		TOTAL	
Groups	Mean t Value		Mean t Value		Mean t Value		Mean t Value	
Delhi	12.92		15.51		14.28		14.23	
Hindu	11.85	0.039	17.05	0.838	14.00	0.168	14.50	N.S.
Delhi	12.92		15.51		14.28		14.23	
Bohra	10.00	1.369	13.10	1.227	11.50	1.078	12.53	N.S.
Delhi	—		15.51		14.28		14.23	
Tribe	—		8.00	3.690**	16.71	0.807	11.59	N.S.
Hindu	11.85		17.05		14.60		14.50	
Bohra	10.00	0.079	13.10	1.417	11.50	1.349	12.53	N.S.
Hindu	—		17.05		14.60		14.50	
Tribe	—		8.00	3.132**	16.71	0.784	11.59	N.S.
Bohra	—		13.10		11.50		12.53	
Tribe	—		8.00	2.262*	16.71	2.189*	11.59	N.S.

*t value significant at .05

**t value significant at .01

No significant differences were found between total groups of different sample, which showed a more or less same trend of behaviour in every sample and community. But when retaliation was studied or, in other words, when comparisons were made between different areas or communities for separate classes no area difference was found for retaliation in Class IV Ss. Maximum number of differences were found when Class VI Ss were compared. Class VI Tribal Ss showed significantly less retaliation than Delhi Class VI Ss ($P < .01$) Class VI Hindu Ss ($P < .01$), and Class VI Bohra Ss ($P < .05$) As for Class VIII Ss Tribal Ss showed highest retali-

ation ($M=16.71$) and Bohra *Ss* showed lowest retaliation ($M=11.50$), and these two groups differed significantly from each other (t value significant at .05 level) (Table 11).

Means of different classes also showed that retaliation of Class VI *Ss* increased significantly from Class IV *Ss* (Delhi and Hindu) and it was significant at .05 level. An interesting trend was noticed in Table 11 that the retaliation (mean) shown by Class VIII *Ss* of different communities were found to be lesser than Class VI as well as Class IV. Though differences between these classes were not statistically significant, observed trend could not be ignored.

TABLE 11

Development of Retaliation (Re) in Different Communities

GROUPS	DELHI		HINDU		BOHRA		TRIBAL	
Class	Mean	t Value	Mean	t Value	Mean	t Value	Mean	t Value
IV	12.92		11.85		10.00			
VI	15.51	2.010*	17.05	2.163*	13.09	1.154		
IV	12.92		11.85		10.00			
VIII	14.26	0.879	14.26	1.298	11.50	0.550		
VI	15.51		17.05		13.09		8.00	
VIII	14.26	0.818	14.60	1.048	11.50	0.786	16.71	3.287**

* t value significant at .05

** t value significant at .01

So far as age differences were concerned (Table 12), Class IV combined groups of Delhi and Hindu significantly differed from Class VI combined groups of the same sample, at .05 level of significance. Tribal Class VIII girls scored high ($M=16.7$) than Class VI girls ($M=8.00$) and this difference was significant at .01 level.

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TABLE 12
Age Differences in Retaliation (Re)

GROUPS	DRHAT		HINDU		BOHRA		TRIBE	
Class	Mean t Value		Mean t Value		Mean t Value		Mean t Value	
IV B	16.34		8.50		10.10			
VI B	14.55	0.854	14.40	1.065	13.30	1.082	—	
IV B	16.34		8.50		10.10			
VIII B	16.30	0.011	10.00	.687	11.40	0.493	—	
VI B	14.55		14.40		13.30			
VIII B	16.30	0.393	10.90	0.855	11.40	0.095	—	
IV G	12.54		15.20		9.00			
VI G	14.80	1.173	18.20	0.309	12.00	0.625	—	
IV G	12.54		15.20		9.00			
VIII G	11.75	0.363	12.00	0.604	11.60	0.332	—	
VI G	14.80		18.20		12.00			
VIII G	11.75	1.702	12.00	0.893	11.00	0.392	8.00 16.71	3.287**
IV C	11.40		11.85		—		—	
VI C	16.35	2.303*	17.80	2.109*	—		—	
IV C	11.40		11.85		—		—	
VIII C	14.50	1.774	17.75	1.942	—		—	
VI C	16.35		17.80		—		—	
VIII C	14.50	0.930	17.75	0.019	—		—	

*t value significant at .05

**t value significant at .01

B=Boys,

G=Girls,

C=Combined pairs

TABLE 13

Sex Differences in Retaliation (Re)

GROUPS	DELHI		HINDU		BOHRA	
Class	Mean	t Value	Mean	t Value	Mean	t Value
IV B	18.34		8.50		10.10	
IV G	12.54	1.638	15.20	1.506	9.90	0.041
VI B	14.55		14.40		13.30	
VI G	14.80	0.161	18.20	0.541	12.90	0.135
VIII B	16.30		10.90		11.40	
VIII G	11.75	1.011	12.00	0.278	11.60	0.640
IV C	11.40		11.85		—	
IV B	16.34	2.195*	8.50	0.957	—	
IV C	11.40		11.85		—	
IV G	12.54	0.512	15.20	0.791	—	
VI C	16.35		17.80		—	
VI B	14.55	0.711	14.40	1.074	—	
VI C	16.35		17.80		—	
VI G	14.80	0.629	18.20	0.09	—	
VIII C	14.50		17.75		—	
VIII B	16.30	0.530	10.90	1.943	—	
VIII C	14.50		17.75		—	
VIII G	11.75	1.472	12.00	1.655	—	

*t value significant at .05

**t value significant at .01

B=Boys,

G=Girls,

C=Combined pairs

When *t* values were calculated to find out sex differences in each class regarding retaliation (Table 13) no *t* values, except in one case, was found statistically significant. Only Class IV boys of Delhi sample showed more retaliation than Class IV combined group ($P < .05$).

Exploitation

Over-all means of different sample groups showed that Delhi *Ss* and Hindu *Ss* were more exploitative than other two groups and Bohra was less exploitative than other groups. Mean differences between high and low exploitation were found to be significant at .01 level for both the cases. In Table 14, *t* values between these two combinations were also found significant at .01 level for Class IV

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Ss. Among Class VI *Ss* no area and community difference was found, a trend common to all sample groups. Among Class VIII *Ss* only Delhi *Ss* showed more exploitative tendency than Bohra *Ss* ($P < .05$) means were reported 10.27 and 6.25, respectively. When only group-

TABLE 14
Group-wise Mean Differences in Exploitation

CLASS	IV		VI		VIII		TOTAL	
Groups	Mean t Value		Mean t Value		Mean t Value		Mean t Value	
Delhi	13.16		10.51		10.27		11.32	
Hindu	11.55	1.029	14.12	1.935	9.47	0.554	11.72	N.S.
Delhi	13.16		10.51		10.27		11.32	
Bohra	6.25	3.363**	10.70	0.110	6.25	2.277*	7.73	3.451**
Delhi	—		10.51		10.27		11.32	
Tribe	—		8.65	1.080	10.14	0.065	9.26	N.S.
Hindu	11.55		14.12		9.47		11.72	
Bohra	6.25	2.503*	10.70	1.027	6.25	1.559	7.73	2.860**
Hindu	—		14.12		9.47		11.72	
Tribe	—		8.65	1.632	10.14	0.285	9.26	N.S.
Bohra	—		10.70		6.25		7.73	
Tribe	—		8.65	0.833	10.14	1.752	9.26	N.S.

*t value significant at .05

**t value significant at .01

wise means were compared for each class, it was found that in Delhi sample Class IV *Ss* were more exploitative ($M=13.16$) than Class VI and Class VIII *Ss* ($M=10.51$ and 10.27 , respectively) and mean differences were found statistically significant at .05 level (Table 15).

TABLE 15
Development of Exploitation in Different Communities

GROUPS	DELHI		HINDU		BOHRA		TRIBE	
Class	Mean t Value		Mean t Value		Mean t Value		Mean t Value	
IV	13.16		11.55		6.25	1.814	—	
VI	10.51	2.232*	14.12	1.028	10.70		—	
IV	13.16		11.55		6.25	0.0	—	
VIII	10.27	2.353*	9.47	1.187	6.25		—	
VI	10.51	0.217	14.12	1.838	10.70	1.974	8.65	
VIII	10.27		9.47		6.25		10.14	0.593

*t value significant at .05

When age differences were calculated separately for boys, girls and combined groups, it was found that Delhi Class IV girls were more exploitative ($M=16.20$) than Class VIII girls ($M=9.70$), and t value was significant at .05 level. In Hindu sample just opposite sex difference was found, i.e., Class IV boys were more exploitative ($M=11.50$) than Class VIII boys ($M=5.80$), and that t value was also significant at .05 level. In Bohra community, Class IV girls were found less exploitative ($M=2.60$) than other two classes and Class VI girls were more exploitative ($M=13.59$) than other two classes. Mean differences between Class IV girls and Class VI girls, and Classes VI and VIII girls were found to be significant at .01 level. So far as sex differences in three classes were concerned, only in Bohra community Class IV boys exploited their partner more than Class IV girls and t value was significant at .05 level. When combined groups were compared either with boys' or girls' group, it

TABLE 16
Age Differences in Exploitation

GROUPS	DELHI		HINDU		BOHRA		THIRU		
Class	Mean t Value		Mean t Value		Mean t Value		Mean t Value		
IV B	12.40	0.696	11.50	0.287	9.90	0.567	—		
VI B	10.85		10.40		7.80				
IV B	12.40	1.000	11.50	2.171*	9.90	0.403	—		
VIII B	8.65		5.80		8.30				
VI B	10.85	0.866	10.40	1.524	7.80	0.149	—		
VIII B	8.65		5.80		8.30				
IV G	16.20	1.199	11.60	1.496	2.60	3.954**	—		
VI G	12.95		23.50		13.59				
IV G	16.20	2.362*	11.60	0.438	2.60	0.861	—		
VIII G	9.70		13.70		4.20				
VI G	12.95	1.498	23.50	1.161	13.59	3.278**	8.65	0.593	
VIII G	9.70		13.70		4.20		10.14		
IV C	12.02	1.809	11.55	0.105	—	—	—		
VI C	9.12		11.30		—				
IV C	12.02	0.386	11.55	1.022	—	—	—		
VIII C	11.37		9.20		—				
VI C	9.12	1.574	11.30	0.958	—	—	—		
VIII C	11.37		9.20		—				

* t value significant at .05

** t value significant at .01

B=Boys,

G=Girls,

C=Combined pairs

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was found that both in Delhi and Hindu sample Class VI girls were much more exploitative than the combined groups of the same class. Mean differences were found statistically significant at .05 level in both the cases (Table 16).

TABLE 17
Sex Differences in Exploitation

Groups	DELHI		HINDU		BOHRA	
Class	Mean t Value		Mean t Value		Mean t Value	
IV B	12.40	1.425	11.50	0.027	9.90	2.244*
IV G	16.20		11.80		2.60	
VI B	10.85	0.921	10.40	1.635	7.80	1.760
VI G	12.95		23.50		13.50	
VIII B	8.05	0.430	5.80	1.900	8.30	1.393
VIII G	9.70		13.70		4.20	
IV O	12.02	0.179	11.55	0.010	—	—
IV B	12.40		11.50		—	
IV O	12.02	1.718	11.55	0.010	—	—
IV G	16.20		11.60		—	
VI O	9.12	0.958	11.30	0.204	—	—
VI B	10.85		10.40		—	
VI O	9.12	2.250*	11.30	2.151*	—	—
VI G	12.95		23.50		—	
VIII O	11.37	1.354	9.20	1.551	—	—
VIII B	8.05		5.80		—	
VIII O	11.37	0.889	9.20	1.302	—	—
VIII G	9.70		13.20		—	

*t value significant at .05

**t value significant at .01

B=Boys,

G=Girls

O=Combined pairs

Trustworthiness

It is an index of continuous mutual cooperation. From Table 18 it was found that the highest trustworthiness was shown by Tribes (M=24.85) and the lowest was shown by the Delhi students (M=18.60). Mean difference of the highest and the lowest trustworthy group was only found to be significant at .01 level (Table 18). The Class IV and VI of Delhi were found significantly less trustworthy than Bohra Ss and t values were found statistically significant at .05 level. Class VI Ss of Tribal sample showed the highest trustworthiness (M=36.10) than any other group of the same class and

TABLE 18

Group-wise Mean Differences in Trustworthiness

CLASS	IV		VI		VIII		TOTAL	
Groups	Mean t Value		Mean t Value		Mean t Value		Mean t Value	
Delhi	14.06	0.989	10.27	1.478	16.47	0.956	13.60	N.S.
Hindu	16.40		31.25		10.57		10.41	
Delhi	14.06	2.383*	10.27	2.146*	16.47	1.255	13.60	N.S.
Bohra	26.10		15.80		6.20		16.03	
Delhi	—		10.27	6.220**	16.47	0.787	13.60	2.691**
Tribe			36.10		8.78		24.85	
Hindu	16.40	1.432	31.25	0.541	10.57	0.934	19.41	N.S.
Bohra	26.10		15.80		6.20		16.03	
Hindu	—		31.25	0.168	10.57	0.324	19.41	N.S.
Tribe			30.10		8.78		24.85	
Bohra	—		15.80	2.580*	6.20	0.996	16.03	1.039
Tribe			36.10		8.78		24.85	

*t value significant at .05

**t value significant at .01

they differed significantly from Delhi Ss and Bohra Ss at .01 and .05 level of significance, respectively. Group-wise no difference was found for Class VIII Ss. When different classes of various communities were compared (Table 19) it was found that in the Delhi sample, only Class IV Ss showed significantly greater trustworthiness than Class VI Ss ($P < .05$) though Class VIII Ss of the same sample scored highest in trustworthiness, but they did not significantly differ from other classes.

TABLE 19

Development of Trustworthiness in Different Communities

GROUP	DELHI		HINDU		BOHRA		TRIBE	
Class	Mean t Value		Mean t Value		Mean t Value		Mean t Value	
IV	14.06	2.218*	16.40	0.787	26.10	1.123	—	
VI	10.27		31.25		15.80			
IV	14.06	0.565	16.40	1.527	26.10	2.249*	—	
VIII	16.47		10.57		6.20			
VI	10.27	1.470	31.25	1.019	15.80	2.770**	36.10	3.087**
VIII	16.47		10.57		6.20		8.78	

*t value significant at .05

**t value significant at .01

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Just an opposite behavioural pattern was found in Bohra community, where Class VIII Ss showed significantly less trustworthiness than Class IV Ss and Class VI Ss of the same community and t values between those two classes were found to be significant at .05 and .01 level, respectively. Tribal Class VI Ss scored very high in trustworthiness in comparison to Class VIII Ss of the same community and difference was significant at .01 level.

From Table 20 it can be seen that in Delhi sample, Class VI girls showed comparatively low trustworthiness than Class VIII girls of Delhi and Class IV combined group showed comparatively high trustworthiness than Class VI combined group, and both the t values were found significant at .05 level. Class IV Hindu combined group showed the highest trustworthiness than other two combined groups and t values were found to be statistically significant for all the three combinations. Class VIII Bohra girls scored significantly less than Class IV girls and Class VI girls (t values were significant at .05 level). Class VI tribal girls also showed higher trustworthiness than Class VIII girls ($P < .01$).

TABLE 20
Age Differences in Trustworthiness

Group	DELHI		HINDU		BOHRA		TRIBAL	
Class	Mean	t Value	Mean	t Value	Mean	t Value	Mean	t Value
IV B	9.75		10.00		11.20		—	
VI B	10.45	0.235	13.80	0.804	13.10	0.373	—	
IV B	9.75		10.00		11.20		—	
VIII B	9.10	0.240	25.80	0.528	8.60	0.555	—	
VI B	10.45		13.80		13.10		—	
VIII B	9.10	0.429	25.80	0.950	8.60	0.917	—	
IV G	16.85		13.80		41.00		—	
VI G	12.60	1.352	95.20	0.083	18.50	1.310	—	
IV G	16.85		13.80		41.00		—	
VIII G	22.45	1.067	8.29	1.146	3.80	2.261*	—	
VI G	12.60		95.20		18.50		30.10	
VIII G	22.45	2.143*	8.20	1.051	3.80	2.871*	8.78	3.087**
IV C	14.80		16.40		—		—	
VI C	9.07	2.182*	8.00	2.420*	—	—	—	
IV C	14.80		16.40		—		—	
VIII C	17.17	0.204	4.10	3.946**	—	—	—	
VI C	9.07		8.00		—		—	
VIII C	17.17	1.018	4.10	2.212*	—	—	—	

* t value significant at .05

** t value significant at .01

B=Boys,

G=Girls,

C=Combined pairs

TABLE 21

Sex Differences in Trustworthiness

GROUP	DELHI		HINDU		BOMBA	
Class	Mean	t Value	Mean	t Value	Mean	t Value
IV B	9.75	2.89*	10.00	0.824	11.20	1.780
IV G	10.85		13.80		41.00	
VIB	10.45	0.713	13.80	0.983	13.10	0.877
VI G	12.50		95.20		18.50	
VIII B	9.10	2.771**	25.80	1.435	8.00	1.365
VIII G	22.45		8.30		3.80	
IV C	14.80	1.565	16.40	0.482	—	—
IV B	9.75		19.00		—	
IV C	14.80	0.580	16.40	0.492	—	—
IV G	16.85		13.80		—	
VI C	9.07	0.492	8.00	1.922	—	—
VIB	10.45		13.80		—	
VI C	9.07	1.368	8.00	1.518	—	—
VI G	12.05		95.20		—	
VIII C	17.17	0.723	4.10	2.584*	—	—
VIII B	9.10		25.80		—	
VIII C	17.17	0.459	4.10	2.454*	—	—
VIII G	22.45		8.30		—	

*t value significant at .05

**t value significant at .01

B=Boys,

G=Girls,

C=Combined pairs

Sex differences in trustworthiness are reported in Table 21. In Delhi *Ss* sex differences were found between mean scores of boys and girls of Class IV, as well as Class VIII ($P < .05$) and ($P < .01$) respectively. Among Hindu *Ss* Class VIII combined group scored the lowest in trustworthiness than Class VIII boys' and girls' groups and both the *t* values were significant at .05 level.

Mean, median and SD values of the six variables for various groups for the three age levels can be seen in Table 22. In order to find the interaction amongst the variables analysis of variance was run amongst 84 sample groups. The *F* ratios are shown in Table 23. Only those variables from this table were taken for further calculation which were statistically significant at least at .05 level of significance. Therefore, for developmental study, and for other comparative study, only six variables were taken for consideration.

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These are Cooperation (discussed in Parcek and Banerjee, Unpublished), Trust, Repentance, Retaliation, Trustworthiness and Exploitation. An overall view of Forgiveness is presented in the table showing group-wise mean and SD for each class. Overall area-wise result will be presented first.

TABLE 22

Mean, Median and SDs of the Different Groups for the Six Dimensions

CLASSES	IV			VI			VIII		
Variables	Mean	Mdn	SD	Mean	Mdn	SD	Mean	Mdn	SD
Trust									
Delhi	13.80	15.00	7.46	15.77	15.50	0.86	15.85	15.59	10.13
Hindu	11.97	10.00	9.44	16.02	17.00	8.45	16.17	14.50	9.34
Bohra	10.15	7.00	9.67	13.65	13.00	0.28	11.05	11.00	6.69
Tribals	—	—	—	7.35	5.50	6.38	17.21	16.00	5.78
Repentance									
Delhi	12.38	11.50	7.84	9.55	9.00	5.60	8.37	7.00	0.61
Hindu	11.77	11.00	8.16	14.05	10.50	14.47	7.70	9.50	5.41
Bohra	5.06	2.50	7.03	9.75	0.00	7.18	5.70	3.00	5.68
Tribals	—	—	—	0.35	6.50	8.89	9.73	8.50	6.76
Retaliation									
Delhi	12.92	13.50	8.03	15.51	14.00	8.15	14.20	12.00	10.87
Hindu	11.85	8.50	9.68	17.05	15.50	11.47	14.90	15.00	0.02
Bohra	10.00	7.00	9.99	13.10	12.50	6.10	11.50	11.50	0.44
Tribals	—	—	—	8.00	5.50	7.70	16.71	15.00	0.89
Exploitation									
Delhi	13.10	12.00	8.25	10.51	10.00	6.58	10.27	8.50	7.13
Hindu	11.55	12.50	7.55	14.12	9.00	13.70	9.47	9.50	7.87
Bohra	6.25	2.00	7.69	10.70	10.00	7.43	6.25	3.00	6.43
Tribals	—	—	—	8.05	5.50	7.73	10.14	11.50	5.81
Forgiveness									
Delhi	13.34	9.00	14.44	9.57	9.00	6.56	8.95	9.00	8.24
Hindu	15.25	13.00	13.34	26.95	9.00	32.37	7.47	5.00	7.87
Bohra	6.50	3.00	20.35	9.90	8.50	8.35	9.55	4.00	18.01
Tribals	—	—	—	11.75	5.50	17.25	8.57	8.00	15.67
Trustworthiness									
Delhi	14.00	12.00	11.95	10.27	8.00	9.30	10.47	8.00	30.05
Hindu	10.40	12.50	13.12	31.25	10.00	25.13	10.57	4.50	19.88
Bohra	16.10	10.00	37.79	15.80	11.00	13.02	6.20	2.50	7.67
Tribals	—	—	—	36.10	34.00	31.64	8.78	8.50	6.55

From Table 22 it can be seen that SDs are quite high, in comparison to the mean scores. This was partly due to the range of the scores for each variable, and partly due to the number of Ss included in each class. In most of the cases the range of scores was from 0 to 50 (Trust, Repentance, Retaliation and Exploitation), and in some of the cases it was from 0 to 100 (Trustworthiness, and Forgiveness).

TABLE 23
Analysis of Variance Between 34 Sample Groups (N=454)

S. No.	Variables	Mean	SD	F ratio
1.	Age	11.25	2.01	38.881**
2.	Cooperation	44.98	22.03	2.808**
3.	Competition	55.24	22.07	1.344
4.	Trust	13.86	8.08	2.329**
5.	Repentance (R)	9.93	8.00	2.247**
6.	Retaliation (Re)	13.72	9.27	2.235**
7.	Exploitation	10.77	8.30	2.271**
8.	Forgiveness	11.80	34.13	1.370
9.	Trustworthiness	10.27	42.74	1.895**

*F value significant at .05

**F value significant at .01

To find out the relationship amongst all the cooperative and competitive behaviour variables, correlations were calculated. Inter-correlations appear in Table 24.

TABLE 24
Inter-correlation Matrix (N=454)
Variables

	Trust	Repen- tance	Retalia- tion	Exploi- tation	Forgive- ness	Trust- worthi- ness	Cooperation	Competition
	T	R	Re	E	F	Tr	C	D
Age	.033	-.176**	-.0003	-.120**	-.087	-.038	-.167**	.125**
T		.022	-.802**	-.165**	-.020	-.131**	.140**	.267**
R			.281**	.852**	.395**	.393**	.266**	.035
Re				.114*	.279**	.135**	.169**	.827**
E					.311**	.326**	.258**	.024
F						.843**	.810**	-.029
T							.893**	-.078
Cr								-.289**

*r value significant at .05

**r value significant at .01

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This inter-correlation matrix was calculated for the total sample (N=454). Most of the r values of this table were found significant at .01 level. The age had a positive relation with competition and a negative relationship with cooperation. High positive correlations were found between trust and retaliation, repentance and exploitation and forgiveness and trustworthiness. Forgiveness and trustworthiness had positive relationship with cooperation and negative correlation with competition.

Loomis (1959) reported that trustworthy Ss perceived trust and cooperated. Which in other words can be said that trustworthiness should have high correlation with trust and cooperation. But in the present study it was found that trustworthiness had positive and significant (.01 level) relationship with cooperation but it had significant (at .01 level) negative relationship with trust.

Another interesting aspect of the behaviour is stability or shift in behaviour of an individual. In order to study this aspect the behaviour shown in the initial phase (first ten trials) was compared with the behaviour shown in the end phase (last ten trials). Tables 25 and 26 show the percentage of occurrence of different behaviour in the first and the last ten trials of the game.

TABLE 25
Percentage of Occurrence of Each Behaviour of Delhi Ss

<i>Trial No.</i>	<i>Trust</i>	<i>Repentance</i>	<i>Retaliation</i>	<i>Exploitation</i>	<i>Forgiveness</i>	<i>Trustworthiness</i>	<i>Defecting</i>
1	12.08	8.75	9.58	14.17	11.07	18.33	25.42
2	16.07	11.67	13.75	14.58	7.08	15.83	20.42
3	12.02	13.75	12.50	15.42	11.07	12.02	20.83
4	17.08	11.07	15.42	13.33	7.50	15.00	20.00
5	10.42	7.08	10.42	9.17	14.17	17.08	31.67
6	15.42	10.00	13.75	10.83	8.33	10.67	25.00
7	11.07	13.33	15.00	12.50	10.00	13.33	24.17
8	15.42	13.33	10.07	8.75	10.00	13.75	22.08
9	12.08	10.83	16.07	10.42	8.33	10.07	25.00
10	13.33	7.08	7.08	7.92	14.58	17.50	32.50
91	10.00	7.08	10.00	5.83	10.83	10.83	45.42
92	12.50	7.92	15.42	6.67	6.07	9.58	41.25
93	18.75	5.00	11.25	11.07	7.08	6.07	39.58
94	15.00	8.33	9.17	10.42	8.75	9.17	39.17
95	9.58	7.08	15.42	7.92	7.50	9.17	43.33
96	10.83	6.07	8.75	2.08	11.25	11.07	48.75
97	12.50	6.07	13.75	0.25	7.92	12.50	40.42
98	11.07	8.75	12.08	10.42	9.17	8.33	39.58
99	14.17	6.25	12.08	9.58	6.25	9.58	42.08
100	8.33	7.92	13.33	8.75	8.33	5.83	47.50

TABLE 26

Percentage of Occurrence of Each Behaviour in Udaipur Ss

<i>Trial No.</i>	<i>Trust</i>	<i>Repon- tance</i>	<i>Retalia- tion</i>	<i>Exploi- tation</i>	<i>Forgive- ness</i>	<i>Trustwor- thiness</i>	<i>Defecting</i>
1	14.02	13.08	11.21	14.49	11.08	10.75	24.30
2	10.82	14.49	17.76	10.75	7.04	11.08	21.03
3	13.08	12.15	13.08	14.95	10.75	12.15	23.83
4	14.49	14.02	17.29	8.41	11.08	9.81	24.30
5	12.15	7.04	6.64	12.62	12.15	18.69	29.91
6	14.02	11.21	12.02	14.02	14.02	13.08	22.43
7	12.15	15.89	14.95	13.55	11.21	10.28	21.96
8	19.16	10.28	14.49	14.02	9.35	12.15	20.50
9	8.88	18.22	16.35	7.01	13.55	14.49	21.49
10	8.88	7.04	11.21	8.41	13.08	21.03	20.44
91	9.81	6.64	7.01	0.93	14.49	15.42	45.79
92	4.67	9.81	12.62	12.15	6.64	15.42	38.78
93	13.08	8.41	10.75	2.80	7.04	14.95	42.06
94	4.67	4.67	14.49	7.01	8.41	14.02	46.73
95	11.08	6.07	8.88	3.74	9.35	9.35	50.93
96	7.48	6.07	7.04	2.34	11.21	14.95	50.00
97	9.35	7.01	7.48	4.67	9.35	18.22	43.02
98	4.67	3.74	10.75	10.75	3.74	17.20	49.06
99	11.08	7.48	7.04	3.27	8.41	9.81	51.40
100	8.41	7.01	12.15	6.07	7.04	11.21	47.20

It was found in Delhi *Ss* that 25.42 per cent *Ss* started their play by competition (D), 18.38 per cent with trustworthiness, 14.17 per cent with exploitation, etc., whereas when they ended their game in the last (100th) trial 47.60 per cent *Ss* competed in comparison to 5.83 per cent *Ss* who showed trustworthiness. On the other hand, in Udaipur sample, 24.30 per cent *Ss* started their play by competition, 14.49 per cent by exploitation, 14.02 per cent with trust and only 10.75 per cent with trustworthiness, which indicated a completely different trend of behaviour than the Delhi sample. In the last trial of the game 47.20 per cent *Ss* of this sample showed competition (D). This behaviour was found quite similar in both the samples. A marked difference was found regarding trustworthiness. In the Delhi sample with an increase in competition (D), a marked decrease was observed in trustworthiness in the 100th trial of the game but the Udaipur sample did not show that type of behaviour. In comparison to the Delhi sample, about 50 per cent more *Ss* had shown trustworthiness in the Udaipur sample. Percentage of *Ss* showing other behaviour in the last trial was quite similar in both the samples.

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TABLE 27
Percentage of Occurrence of Each Behaviour in the First and Last 25 Trials

GROUPS		DELHI		HINDU		BORRA		TIRRES		UDALPUR	
Variables		Mean %	C.R.	Mean %	C.R.	Mean %	C.R.	Mean %	C.R.	Mean %	C.R.
T	I	14.34	2.789**	15.21	4.701**	13.12	3.880**	7.72	0.799	13.43	5.974**
	II	12.58		11.07		8.87		6.71		.70	
R	I	10.35	5.140**	22.39	4.207**	8.88	3.397**	11.40	3.321**	10.63	6.538**
	II	7.65		8.13		5.47		5.76		7.01	
Re	I	12.74	0.120	13.47	2.528*	12.85	2.911**	12.87	2.909**	13.20	4.555**
	II	12.81		11.30		9.47		8.47		10.34	
E	I	12.15	7.452**	13.26	6.789**	9.58	5.054**	7.47	2.47*	11.31	8.730**
	II	8.02		7.83		4.80		4.590		6.47	
F	I	10.12	2.099*	10.35	2.080*	10.35	3.939**	9.44		10.20	3.362**
	II	8.98		8.77		6.33		10.12		8.30	
Tr	I	14.96	9.426**	10.56	2.797**	16.11	2.823**	21.69		13.88	0.586
	II	19.30		12.90		12.47		22.35		14.28	
D	I	25.33	17.936**	25.76	11.765**	29.31	13.341**	29.41	5.412**	27.34	16.925**
	II	40.67		40.00		52.80		42.00		43.91	

I means first 25 trials of the game, and II means last 25 trials of the game

*CR significant at .05

**CR significant at .01

Later on, to compare the first 25 trials and the last 25 trials of the game, percentage of each behaviour was calculated for the total number of trials, and then significant differences were calculated for Delhi as well as other communities. A very interesting trend was observed that in every community competition increased (even up to 52.80 per cent from 29.31 per cent) in the last 25 trials in comparison to the first 25 trials. As a result of which other variables were found to decrease in the last part of the game. As it is shown in Table 27 almost all CR values were found to be significant at .01 or .05 level of significance.

SUMMARY

In Delhi and Bohra *Ss*, trust was found to increase with age. Delhi *Ss* showed highest trust among the sample groups studied, and Tribal *Ss* showed least trust. Sex differences were not found statistically significant when homogeneous groups of boys or girls of different classes and different areas were compared with each other, but when homogeneous groups were compared with heterogeneous group of the same class, some differences were found to be significant.

Lowest repentance was shown by Bohras whereas highest repentance was shown by Hindus. Mean differences between Bohras and Hindus were found significant at .01 and .05 respectively. The tendency of repentance was generally found to decrease with age; some *t* values were also found significant.

Hindu *Ss* scored more in retaliation and Tribal *Ss* scored less, in comparison to other sample of Delhi and Bohra community. Except in one case, no sex difference was found when heterogeneous and homogeneous groups were compared.

No particular developmental tendency was observed so far as exploitative behaviour was concerned. A very interesting result was found that in some cases girls were found to be more exploitative than boys of the same group.

In contrast to repentance and retaliation, Tribal *Ss* showed highest trustworthiness, among all other groups, whereas lowest trustworthiness was shown by Delhi *Ss*. No particular develop-

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mental trend was observed in this behaviour. Homogeneous groups of only Delhi Class IV and Class VIII were found to differ statistically in their mean trustworthiness score, and homogeneous groups of Hindu Class VIII were found to significantly differ from heterogeneous groups of the same class.

The interesting shift from the initial response pattern (1 to 10 trials) to the end response pattern (91 to 100 trials) was in the increase in defecting behaviour, and decrease in almost all six variables, except retaliation and forgiveness which remained more or less similar.

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A Study of Reactions to Frustration and Intelligence Levels of Fifth-Grade Children of Delhi Schools

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As part of a larger survey, Pareek's (1959) Children's Form adaptation of Roscnzweig's Picture-Frustration Test and Mchta's (1962) Group Test of Intelligence were given to 1700 Class V children drawn from 50 primary and middle schools in Delhi. The results reported here are intended to serve as norms for these two tests.

Since Pareek *et al.* (1970) reported the development of a battery of pre-adolescent tests, a series of research papers have been published giving details of the findings of the surveys conducted using these tests at Delhi, Coimbatore and Calcutta (Pareek and Rao, 1971, Rao *et al.*, 1972, Rao, 1972, Purushotaman and Rao, 1972). As indicated in these papers the surveys at Delhi were conducted on about 1700 fifth-grade children drawn from 50 primary and middle schools of Delhi. Along with the battery of personality tests

The data reported here are taken from the Indian Council of Medical Research Project on Motivation Training for Mental Health, completed in 1971 by Professor Udai Pareek, Shri B.R. Sharma, Km. D. Banerjee and the present authors at the National Institute of Health Administration and Education, New Delhi.

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(viz., Pre-adolescent Adjustment Scale, Pre-adolescent Dependency Scale, Pre-adolescent Initiative Questionnaire), Pareek's adaptation of Rosenzweig's Picture-Frustration Test (Children's Form, Pareek, 1959) and Group Test of Intelligence developed by Prayag Mehta (Mehta, 1962) were administered to the same sample. The results of the survey on these tests are reported here. The results reported here are intended to serve as norms for the two tests.

Sample

A number of P-F protocols had to be rejected for incomplete data. The results reported here are based on the responses of 948 fifth-grade students of Delhi on the picture-frustration test whose protocols were accepted. The sample for the norms on Prayag Mehta's Group Test of Intelligence are based on 1,230 fifth-grade students of Delhi.

Scoring

The scoring system given by Pareek and Rosenzweig (1959) in their manual was followed in scoring these responses in P-F test. Scoring was done by an expert trained in scoring this test. The responses of the children were scored for the direction of aggression and types of reactions to aggression. The responses were also scored for E, E, e, I, i, and m factor scores, group conformity ratings and trends. Brief descriptions of these factors are given while presenting the results. Percentile norms as well as converted IQ scores are presented for boys and girls separately on Prayag Mehta's Group Test of Intelligence.

Results

Reactions to Frustration. Direction of Aggression: under direction of aggression, whether the aggression is turned on the subject himself known as intropunitiveness or aggression, is evaded in an attempt to gloss over the frustration were studied. The responses

of each student to each frustrating situation was classified under one of these three categories. As there are 24 situations in the test, each of the 24 responses given by a student to the 24 frustrating situations can be classified into one of the three response categories: extra-punitive response, intropunitive response, and impunitive response.

From the number of responses classified into these three categories, percentage of responses given by each student under each category were calculated. These percentages represent the extra-punitive, intropunitive and impunitive scores of each individual. Average of these percentages for the total sample were computed.

Extrapunitive responses (E) given by the pre-adolescents of this study on an average were found to be about 60 per cent, while the intropunitive (I) responses given by them on average were found to be about 15 per cent. In other words, on average in only 15 out of 100 situations we can expect a pre-adolescent of this age to blame himself when faced with a frustrating situation and in rest of the 25 per cent situations he tends to evade aggression in an attempt gloss over frustration (Impunitiveness or M). Pareek (1959) found in his study the average percentage of E, I, and M responses to be 51, 22 and 26 respectively for ninth years; 49, 24 and 27 respectively for tenth years and 47, 25 and 28 respectively for the twelfth years. The observations made in the present study are similar to those made by Pareek (1959) in that the pre-adolescents tend to be more extra-punitive and less intropunitive with slightly more impunitive tendencies.

Types of Reaction. Under the types of reaction the responses were analysed to see whether the student stresses the barrier occasioning the frustration in his response (Obstacle Dominance or O-D), or whether he defends his ego by making it predominate (Ego Defence or E-D) or whether he emphasises the solution of the frustrating problem (Need-Persistence or N-P). The responses given to each of the 24 situations could be classified under one of these types. Percentage of responses given by each student falling under the three types of reactions mentioned above were calculated as suggested in the manual and mean percentages for the total sample were worked out.

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On an average in about 57 per cent of the responses to frustration the pre-adolescents stressed their ego and gave ego-defence reactions; in about 26 per cent of the situations they gave importance to solving the problem and gave need-persistent responses; and in about 17 per cent of the situations they stressed the obstacle that is causing them frustration and gave obstacle-dominant responses.

These percentages tally to a great extent with those observed by Pareek (1959). With the ninth-year children he found the ego-defence reactions to be about 62 per cent, need-persistent reactions were about 26 per cent, and Obstacle-Dominance responses were about 12 per cent. This was 56 per cent (E-D), 32 per cent (N-P) and 12 per cent (O-D) for the tenth-year children respectively. In general it can be said that the Delhi pre-adolescents tend to be more ego-defensive in their reactions to frustration and need-persistent in only some occasions.

Direction Combined Reaction Types of Pre-Adolescents. To go a little more deeper into the reaction patterns of these pre-adolescents, a few more scores suggested by Pareek and Rosenzweig (1959) were calculated. The same are described below:

1. E factor score—The number of reactions given in which the presence of the frustrating obstacle is insistently pointed out (i.e., Extra-punitiveness combined with Obstacle Dominance).
2. E factor score—The number of reactions given by the student in which blame, hostility, etc., are turned against some person or thing in the environment. (It is different from E score or Extra-punitiveness score which is percentage of E'+E—c factor score).
3. e factor score—The number of reactions in which solution for the frustrating situation is emphatically expected of someone else. (Extra-punitiveness with Need Persistence).
4. I factor score—The number of reactions in which blame, censure, etc., are directed by the child upon himself (Intro-punitiveness combined with Ego-Defense).
5. i factor score—The number of reactions in which amends are offered by the subject, usually from a sense of guilt, to solve the problem (Intropunitive Need-Persistent Reactions).

6. *m* factor score—The number of reactions in which expression is given to the hope that time or normally expected circumstances will bring about a solution of the problem; and in which patience and conformity are characterised.

The score of each of the above factors is the number of situations (pictures) in which that factor is scored to be present out of the total 24 situations. These were not converted into percentages as done earlier for E, I, M and E-D, O-D, and N-P scores.

7. Group conformity rating—Which is the percentage of responses given by the student which confirm to the expected responses. The expected responses are based on the sample studied by Pareek and Rosenzweig (1959) in their Indian adaptation of this test. For each situation they have given the most likely accruing factor based on their study with children. The number of situations out of the total 24 in which the response given by the student is the same as the one expected were counted. From this the percentages of situations in which he gave conformity responses were calculated which form the GCR score of an individual.
8. Trends—This is the number of times the student has shifted from giving consistently one direction or type of responses. This also gives a measure of flexibility of student in his responses to frustrating situations. (Mere shift from one type or direction of response to another cannot be classified as a trend. There are certain criteria and significance levels given in the manual on the basis of which these trends were calculated.)

The mean scores observed in this study for the first six of the above factors and the means obtained on these factors by Pareek and Rosenzweig (1959) in their 1957 study for 8- to 11-year children are presented in Table 1.

Table 1 reveals a good deal of similarity in the results of the two studies. However, the Extra-Punitive-Obstacle-Dominance reactions, and Extra-Punitive-Need-Persistence reactions are comparatively more in the pre-adolescents studied in this study. While the rank order of the factors related to extra-punitiveness is same in both these studies, the trend is reversed with regard to the intro-

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TABLE 1

Mean Scores on Six Factors of Picture Frustration Study Obtained in This Investigation and the Mean Factors Obtained by Pareek and Rosenzweig in Their Study for 8 to 9 and 10 to 11-Year Children

	<i>Response Factors</i>					
	E'	E	e	I	i	m
Mean Score observed in this study N=948	2.60	9.70	4.10	2.70	1.00	2.10
Mean Scores obtained by Pareek and Rosenzweig (1959)						
8 to 9 years	0.90	8.70	2.50	1.90	2.90	2.0
10 to 11 years	0.80	8.60	1.50	2.10	3.30	2.40

punitive factor. Intropunitive-Ego-Defense reactions are more than the Intropunitive-Need-Persistence reactions in this group which is just the opposite of the finding in the group studied by Pareek and Rosenzweig (1959). The means for both the groups on Impunitive-Need-Persistence reactions do not differ much.

The mean of the group conformity responses observed for this group is 61.8 per cent with a standard deviation of 12.2. This is comparable with the mean GCR observed in the study which is 65.2 with a standard deviation of 11.7 for the 8-9 year olds and 66.1 with a standard deviation of 9.7 for the 10-11 year olds. This indicates that on an average in about 61 per cent of the responses the pre-adolescents show conformity to the expected responses.

The average of the number of trends for this group is 1.89. The only interpretation that could be made out of this figure in the absence of any norms (Pareek's study does not give any norms for this) is that on an average we can expect a pre-adolescent falling in the age range of 9 to 11 years to show a major change in this type of direction of response two times in 24 reactions.

To summarize the observations made so far the pre-adolescents studied have more tendencies to blame others and defend their ego when faced with frustrating situations and only about 1/4th of them show persistence to overcome the frustration and achieve the goal.

Intelligence Levels of the Pre-Adolescents of Class V. The means and standard deviations obtained for the group of pre-adolescents tested in this study, and the means and standard deviation obtained by Mehta (1962) the students of Class VII to X of Rajasthan having an age range of 12 to 14 years are presented in Table 2.

Considering the age-group of the pre-adolescents tested in this study, which is between the late nines and early elevens, the current pre-adolescents of Delhi seem to be definitely more intelligent than a comparative group of students of Rajasthan in 1955 as could be seen from Table 2. The mean score of the Delhi boys of Class V is even higher than the 11 year and 11 month old boys of Rajasthan who were studying in not less than Class VII when tested.

TABLE 2

Means and Standard Deviations of the Scores on Intelligence Test Obtained by Class V Students of Delhi Tested in 1968 and Class VII to X Students of Rajasthan (Town and Cities) Tested in 1955

Area	Age	Boys			Girls			Boys and girls Combined		
		n	Mean	S.D.	n	Mean	S.D.	n	Mean	S.D.
Delhi	9½ years to 11 years	1005	27.1	8.30	225	26.6	7.82	1489	27.5	8.20
Rajas-	11 years and	30	26.9	7.48	—	—	—	—	—	—
than	11 months									
Do.	12 years and	78	29.06	8.60	33	26.18	8.25	—	—	—
	2 months									
Do.	12 years and	88	30.16	8.31	30	27.50	9.16	—	—	—
	5 months									
Do.	12 years and	93	30.45	8.72	28	27.57	8.83	—	—	—
	8 months									
Do.	12 years and	104	30.77	8.83	30	29.30	8.60	—	—	—
	11 months									
Do.	13 years and	109	30.86	9.06	34	29.90	10.48	—	—	—
	2 months									

The present Delhi boys of Class V seem to have attained the intelligence level of the Class VII, Rajasthan students of 1955. To interpret the same in age level, the 10-year old school boys of Delhi in 1968 were as intelligent as the 12-year old boys of Rajasthan in 1955. This finding is much more clear in girls as the Class V girls of Delhi score more than 12 years and 2 months old girls of

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Rajasthan in 1955. The variation in Delhi sample was also less than that of the Rajasthan sample of girls. It also appears that about 33 per cent of the Delhi boys and about 34 per cent of the Delhi girls exceed the average intelligence level of 13 years and 2 months olds of Rajasthan as they were in 1955.

With these findings it is evident that new norms have to be prepared for this test for any age-group to be tested in Delhi. The norms for the Class V children are given in Table 3 in the form of cumulative percentile frequencies for boys and girls separately.

TABLE 3
Percentile Norms of Class V Children of Delhi for Prayag Mehta's Group Intelligence Test

Boys (N = 1005)		Girls (N = 225)	
Test Scores	Cum. Percentile Frequencies	Test Scores	Cum. percentile Frequencies
50-60	100.0	50-60	100.0
51-50	100.0	51-50	100.0
46-50	99.8	46-50	100.0
41-05	97.3	41-45	99.1
36-40	94.2	36-40	97.3
31-35	85.1	31-35	89.3
26-30	68.1	26-30	68.0
21-25	43.0	21-25	38.7
16-20	20.3	16-20	16.0
11-15	8.3	11-15	9.3
6-10	1.6	6-10	3.1
1-5	0.5	1-5	1.3

Interpretation of Scores Using Percentile Norms. Any score can be converted into a percentile score using the above table and by linear interpolation. For example, if a male student gets a score of 33 in this test then his percentile score ranges between 68.1 and 85.1. By linear interpolation each unit score falling above 30 and below 35 has a percentile value of $(85.1 - 68.1) = 3.4$. Since the score 33 is 3 units above 30 which has a percentile value of 68.1, the percentile score of 33 is $68.1 + 3 \times 3.4 = 78.3$. This means that 78 out of 100 students, have intelligence level below him and about 22 are above him. Similarly, scores obtained by girls can also be interpreted using the above table and by linear interpolation. (Normal interpolation is not suggested since linearity than normality was predominant for the distribution of scores in each class-interval).

Intelligence quotients were also calculated for different scores using the formula suggested by Weschler. The same are presented in Table 4.

TABLE 4

Intelligence Quotients of the Children of Class V Based on the Scores Obtained on Prayag Mehta's Group Intelligence Test in Hindi

Scores	I.Q. for Boys	I.Q. for Girls	Scores	I.Q. for Boys	I.Q. for Girls
80	159	104	86	116	118
59	157	102	85	114	116
58	156	100	84	112	114
57	154	158	33	111	112
56	152	150	32	100	110
55	160	155	31	107	108
54	148	153	30	105	107
53	146	151	29	103	105
52	145	150	28	102	103
51	143	147	27	100	101
50	141	145	26	98	99
49	139	143	25	96	97
48	137	141	24	94	95
47	136	139	23	93	93
46	134	137	22	91	91
45	132	135	21	89	89
44	130	133	20	87	87
43	128	132	19	85	85
42	127	130	18	84	84
41	125	128	17	82	82
40	123	126	16	80	80
39	121	124	15	78	78
38	119	122	14	77	76
37	118	120	13	76	74

Formula for estimating from the scores is :

$$I.Q. = \frac{15}{S.D.} \text{ Score} + \left(100 - \text{Mean} \times \frac{15}{S.D.} \right)$$

The results reported in this study may be used as norms for the students of the age-group 9½ to 11 years.

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Attitude of Rural Parents towards Certain Aspects of Child-Rearing Practices

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This study was undertaken to assess the attitudes of rural parents towards certain aspects of child-rearing practices, and to find out the influence of factors like age, sex and socio-economic status in these attitudes, and also which of these factors is of greater importance.

The study of parental attitudes towards child-rearing is of importance to understand whether there has been a change from the traditional ways of thinking regarding the bringing up of children to the modern concept of rearing children. Most of the studies that are available are based on the data collected from the parents of urban children. However, there are hardly any studies reporting the attitudes towards child-rearing among the rural parents. This study is oriented in that direction.

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It is a common knowledge that in certain families the rearing practices are based on traditional values which are generally oriented to autocratic type of family atmosphere. The studies on authoritarian personality (Adorno, *et. al.*, 1967) have revealed to a great extent that the anti-democratic attitudes influence the parent-child relationships and in turn determines the rearing practices of children.

In autocratic family ideology, discipline assumes a predominant and pervasive role in the child-rearing process. The parental authority demands the child to accept anything on faith rather than on meaningful reason. On the other hand, in the democratic way, the parental pressures are minimized and the child's use of reason and sense of self-determination are maximised (Levinson and Huffman, 1955).

Studies (Hurlock, 1968) have revealed that even the favourable attitude on the part of the parents towards their role of parenthood and on the part of the mother toward pregnancy may become unfavourable after the child is born. This attitude may be due to the inadequacy of the parents to handle the responsibilities involved in looking after the child that is born or due to the child's appearance. The concern and disappointment about the child's appearance sometimes affect the parental attitudes. There are many other factors that influence the type of relationship that emerges between parents and children of which the following have been mentioned to be of special importance (Hurlock, 1968): *The personality of the parents* in terms of their emotional adjustment; *parental expectations* in terms of what they expect their child to become and the extent to which the child becomes successful; *the methods of child training* in terms of rearing children based on the traditional concept of the parental role in which considerable restraint is shown by avoiding too much love and affection to the child, thereby fostering an unfavourable home climate; *attitudes toward parenthood* in terms of perceiving their role as parents unfavourably; *socio-economic status*; and *parental occupations* in terms of the way the child feels about the occupation of his father and, finally, *the solidarity of the family*. All these factors have been found to have some bearing on the parent-child relationship or in determining the parental attitudes towards children. There have been quite a number of studies stressing the importance of each of these aspects in determining the parent-child relationship.

The present study aims to assess the attitudes of the rural parents towards certain aspects of child-rearing practices. It was also attempted to find out the influence of factors like age, sex, and socio-economic status. Further analysis has been made to discover which of the socio-economic factors like family income, caste group, primary occupation of the father, value of total assets possessed and land-holding, is of more importance in determining the attitude of the parents. It was thought that this analysis would throw light on those variables which brings about a more favourable attitude among parents towards child-rearing practices in terms of a change from the traditional to the modern concept of child-rearing.

METHOD

The sample for this study consisted of respondents drawn from seven villages in Chevella Block of Hyderabad district. The household was the sampling unit where both the husband and wife served as respondents. The total number of households selected at random from these seven villages for this study was 342, of which 42 households belonged to the low, 251 to the middle and 49 to the high socio-economic status groups. The latter was assessed based on the information collected in a larger socio-economic survey (Muthayya, 1972) of the study-villages which preceded this study. The items that were taken into account to assess the socio-economic status were: land-holding, cattle wealth, material possessions, educational level, caste, occupation, total cropped area, income, value of assets, type of house, membership in social organizations, etc. This was considered necessary to get a fair coverage of all sections of respondents from the study-villages. The total number of respondents was 684, 342 males and females each. In each of the SES groups also, there were equal number of male and female respondents. The majority of these respondents were in the age range of 25 to 50 years and they were illiterate.

The items for the questionnaire used for this study were drawn from a larger attitudinal study (Muthayya, 1972) covering areas like agriculture, nutrition, education and parental attitudes towards child-rearing. There were 95 items in this original attitude scale.

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Likert's method of scaling was followed and those items were selected based on the discriminatory power of the item. For purposes of this paper, those of the items which were intended to assess the attitudes towards child-rearing were culled out of this larger questionnaire. There were 18 items which belonged to this aspect of the attitudinal study. These items were answered on the basis of a four-point scale, viz., do not know|yes|not sure|no, and it was scored for progressiveness in one's attitude towards child-rearing. The progressiveness or favourableness was conceived to mean an attitude where parents are against regimental or autocratic methods of child-rearing but prefer more democratic and independence training. These 18 items were scored for favourableness and the total score for each of the respondents was calculated. The score range in the 18-item scale was 0-54, where the higher the score, the higher the favourableness of the attitude. In order to find out the internal consistency of these items to constitute a scale, product-moment correlation was worked out between each item score with the total score for a sample of 200 respondents (100 males and 100 females). These 200 respondents were selected at random from 684 respondents for purposes of this analysis. The obtained correlations between each item score with the total score ranged from 0.21 to 0.68. It was decided to retain only those items in this scale where the correlation was significant at 0.01 level. In this process, only 13 items were finally retained to assess parental attitudes towards child-rearing. The reliability of this 13-item scale was worked out using the 200 respondents by the split-half method. The reliability co-efficient after applying the Spearman-Brown Prophecy formula was 0.642 which is significant (.01 level) and considerably high.

The results reported in this paper is based on the analysis of the answers to this 13-item scale. The score range in this scale was 0-39. The items in this scale pertained to assessment of attitudes in the areas of, fatalistic thinking regarding the child born, method of teaching good habits, playing with approved children, praising the children, imparting punishment, showing indulgence in the child, praising children in the presence of others, early marriage of girls, independence to children in decision-making regarding their wants, preferential treatment to male children, feeding the baby whenever it cries and allowing one's children to mix freely with the children

of lower caste. These items covered different aspects in child-rearing touching upon attitudes to breast-feeding through mode of treatment in terms of praise, independence, to early marriage of girls.

The questionnaire was administered to the 684 respondents individually using the personal interview method.

RESULTS AND DISCUSSION

The results are presented for each of the variables independently and discussed.

1. Age

The influence of one's age on one's attitude to child-rearing was available only for males. It is generally believed that as one passes from early adulthood to middle age, one's attitude becomes non-progressive in dealing with children. It is a matter of doubt whether the insecurity that accompanies with the increasing age in any way contributes to one's attitude becoming closed or rigid as a fight against one's own insecurity. The data in Table 1 gives information regarding the attitudes of male respondents belonging to the different age groups.

TABLE 1
Age in Relation to Attitude to Child-rearing among Males

Age Groups	N	Mean	S.D.
Up to 20 years	47	23.79	6.05
20-25 years	148	23.47	4.84
26-30 years	116	24.60	4.85
31-40 years	22	28.27	3.96
41 years and above	9	25.55	4.43

Obtained Score Range 14—36
 F ratio=5.71**

**Significant at .01 level

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TABLE 1a

The t Values for the Mean Difference Between the Different Age Groups among Males

	20-30 years	31-40 years
Upto 20 years	—	3.77**
20-25 years	1.98*	4.58**
26-30 years	—	3.44**

*Significant at .05 level

**Significant at .01 level

The results revealed that the attitude is more favourable in the later (31 years and above) than in the earlier age groups (30 years and below). The 31-40 year age group has a more favourable attitude followed by those in the age group of 41 years and above. This result suggests that as one becomes older, one becomes more liberal in one's attitude towards children. This finding questions the general belief that older people are more rigid in their attitude towards child-rearing than those in the younger age groups. The mean differences are significant at .01 level as revealed by the F-ratio. Table 1a shows that all the compared Mean scores, except that between upto 20 years and 26 to 30 years, are significant. This indicates that the trend of the attitudes revealed in the data is dependable in that the attitude of older males is definitely more favourable than that of the younger ones.

2. Sex

Women by virtue of their traditional roles as wife and mother may maintain a non-progressive attitude towards child-rearing as compared with the men. Table 2 gives the results of attitudes of men and women towards child-rearing.

TABLE 2

Sex Differences in Parental Attitudes to Child-rearing

	Males	Females
N	342	342
Obtained score range	14-36	12-36
Mean	24.26	22.38
S.D.	4.80	4.94
t value		5.00**

**Significant at .01 level

The men have a more favourable attitude than women and the mean difference is significant (0.01 level) as revealed by the t-value. The results suggest that women, true to their traditional outlook on life, are not liberal in their attitude towards child-rearing.

3. Socio-economic Status

It is generally believed that one's socio-economic status influences one's attitude towards child-rearing. It is likely that those persons who belong to a higher socio-economic status may maintain a more favourable attitude than those who belong to lower levels. The results in Table 3 gives information about the influence of socio-economic status on the attitude of males and females towards child-rearing.

TABLE 3

Socio-economic Status Levels and Parental Attitudes towards Child-rearing among Males and Females

	MALES			FEMALES			t-values
	N	Mean	S.D.	N	Mean	S.D.	
Obtained score range	14-36			12-36			
Low	42	23.23	5.02	42	21.05	5.13	1.43NS
Middle	251	24.07	4.50	251	22.22	4.46	4.03**
High	49	26.22	5.07	40	24.00	4.82	2.16*
	F ratio = 5.71**			F ratio = 3.98*			

**Significant at .01 level

*Significant at .05 level

TABLE 3a

t-values for the Mean Differences between the SES Groups among Males and Females

	MALES	FEMALES
	High	High
Low	3.16**	2.58**
Middle	2.08**	2.58*

**Significant at .01 level

*Significant at .05 level

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For males and females, the mean scores show an increasing trend from the lower to higher socio-economic status groups suggesting that the high socio-economic status groups have a more favourable attitude towards child-rearing than the middle and low socio-economic status groups. The mean differences are significant at .01 level among males and at .05 level among females as revealed by the F-ratios. Further analysis through the use of t-values revealed that the mean difference is not significant between the low and the middle groups both among the males and females. This suggests that the high SES group is definitely more favourable in their attitude than the other two groups.

The comparison between the males and females in each of the socio-economic status groups revealed that the males maintain a more favourable attitude than the females in all the socio-economic status groups. However, the mean differences between the males and females in the low socio-economic status group is not significant as revealed by the t-value. This in a way suggests that the differences in the attitude among males and females is considerably less in the lower socio-economic status group but it is maintained to a greater extent among the middle and high socio-economic status groups. It may be said that the males improve in their attitudes with the increase in their levels of living but women, by virtue of being subjected, to a greater extent, to traditional strictures still maintain a less favourable attitude than the males regardless of the improvement in their socio-economic status. These results suggest that the attitude to child-rearing becomes more liberal with the increase in one's socio-economic status. However, this increase in the favourableness is not as much among females as among males.

Further analysis has been made of the influence of the different components of the socio-economic status in order to find out the particular variable which contributes to the parental attitudes towards child-rearing both among the males and females.

4. *Family Income*

The respondents were classified into four income categories based on their family income per annum. Table 4 gives information about

the attitudes of male and female respondents belonging to the different income levels.

TABLE 4

Family Income Levels (in Rupees) and Parental Attitude to Child-rearing among Males and Females

FAMILY INCOME	MALES			FEMALES			t-VALUES
	N	Mean	S.D.	N	Mean	S.D.	
Obtained Score Range	14-36			12-36			
Upto Rs. 1000	88	23.05	3.70	88	21.73	5.05	1.98*NS
Rs. 1001-4000	109	24.28	4.31	109	22.43	4.96	3.48**
Rs. 4001-8000	57	25.39	4.67	57	22.53	5.00	2.90**
Rs. 8001 and above	28	26.00	4.84	28	23.86	6.22	1.44*NS
**F-ratio=4.71				*F-ratio=1.47NS			

TABLE 4a

t-values for the Mean Differences between Family Income Groups

	MALES
	Upto Rs. 1000
Rs. 1001-4000	2.08*
Rs. 4001-8000	3.05**
Rs. 8001 and above	3.02**

*Significant at .05 level ;

**Significant at .01 level

Both males and females in the high income group (Rs. 8000 and above) have a more favourable attitude and those in the low income group (up to Rs. 1000), maintain a less favourable attitude. The mean differences between the different income groups among males are significant at .01 level as revealed by the F-ratio, but they are not significant in the case of females.

Further analysis of the mean differences through t-values among males revealed that the low income group (up to Rs. 1000) differs significantly from all other income groups. However, in this analysis it is clearly shown both among males and females that the attitude becomes more favourable with the increase in one's family income.

Between males and females in each of the income groups, the males maintain a more favourable attitude than the female. How-

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ever, mean differences are not significant in the low (up to Rs. 1000) and high (Rs. 8000 and above) income groups. This suggests that the attitude towards child-rearing remains similar among males and females who belong to high or low income groups in terms of being more liberal or less liberal as the case may be.

5. Caste

The respondents were classified based on their caste into five categories. Table 5 gives information regarding the attitudes of different caste groups. Muslims and Christians have been treated as caste groups for purposes of this discussion.

TABLE 5
*Caste Groups and Parental Attitudes to Child-rearing among
Males and Females*

	N	MALES Mean	S.D	N	Mean	FEMALES S.D.	t-values
Obtained score range	14-36			12-36			
Scheduled Caste	47	23.70	4.97	47	20.98	4.87	2.77**
Backward Caste	148	23.78	4.34	148	21.86	3.85	4.89**
High Caste	117	24.58	4.86	117	23.47	4.93	1.73NS
Muslims	22	28.27	4.15	22	28.68	4.24	3.63 *
Christians	8	25.62	5.64	8	23.25	4.03	0.97NS

**F-ratio=5.61

**F-ratio=4.01

TABLE 5a
*t-values for Mean Differences between the Caste Groups among
Males and Females*

	MALES	FEMALES
	Muslims	High Caste Muslims
Scheduled Caste	3.75**	4.41** 2.37*
Backward Caste	4.52**	2.94**
High Caste	3.44**	

*Significant at .05 level

**Significant at .01 level

The comparison of the attitude of the different caste groups, both among males and females revealed that the Muslims among males and females have a more favourable attitude and the back-

ward castes, a less favourable attitude than the other caste groups. The mean differences among the caste groups are significant (.01 level) both for males and females as revealed by the F-ratios.

Further analysis of the mean differences among the males indicate that these differences are significant only between muslims and each of the other caste groups except the christians. Among females, the mean differences are significant between high caste group, and scheduled caste, and backward caste, and scheduled castes and muslims. These results, to some extent, reveal that one's caste group has some influence on the attitude towards child-rearing. It is found that some caste groups are more liberal in their attitude to child-rearing whereas the other caste groups are less liberal. As for the analysis based on significant mean differences, it might be said that muslims, christians and high caste groups in that order have a more favourable attitude than the other caste groups.

Between the males and females in each of the caste groups, the males maintain a more favourable attitude than the females in all the caste groups. The mean differences between males and females are not significant among the high caste group and the christians. The dissimilarity and similarity of attitudes between males and females in each of the caste groups depends to a great extent on the nature of the family structure that is ordained by the particular caste groups.

6. *Primary Occupation*

It was thought that one's occupation to some extent may influence the attitudes towards child-rearing. Occupations which are hereditary in nature may breed in a different type of attitude to child-rearing compared with those which are acquired by virtue of one's skill or educational attainment. Table 6 gives information regarding the influence of primary occupation on the attitude towards child-rearing.

Among males, those whose occupations are business and trade, and professions, have a more favourable attitude whereas those in household industry, cultivation and agricultural labourers have a less favourable attitude. Therefore, if the occupations are classi-

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TABLE 6

*Parental Attitudes to Child-rearing and Primary Occupation among
Males and Females*

Primary Occupation	MALES			FEMALES†			t-values
	N	Mean	S.D.	N	Mean	S.D.	
No occupation	2	22.0	1.41	2	20.00	4.00	—
Agricultural labourers	55	23.05	4.80	55	21.65	4.48	2.24*
Cultivator	160	23.72	4.04	160	22.34	5.11	2.53*
Business and trade	36	26.07	2.07	36	24.40	6.82	1.80NS
Professions	9	26.33	4.58	9	23.44	7.77	0.90NS
Services	24	24.06	3.70	24	22.71	7.08	1.38NS
Government Services	10	24.00	6.54	10	24.70	4.78	1.01NS
Household industry	22	23.45	4.42	22	21.50	8.44	0.92NS
Miscellaneous (transportation, using donkey, messenger, etc.)	24	25.70	5.00	24	20.25	5.57	3.63**
Obtained score range	14-36			12-36			

*F-ratio=2.46;

**F-ratio=2.80

†for females, the husband's occupation served as a base for this analysis.

Note : *Business and Trade :* Bangle seller, liquor seller, butcher, milk vendor;
Professions : Teacher, ayurvedic doctor, priest, Dal; *Services :* Tailor,
cobbler, barber, washerman; *Government services :* Patwari, Police Patel,
Muli, Kewari, etc.; *Household industry :* Weaver, goldsmith, pot-
maker, blacksmith, etc.

fied based on what was mentioned earlier, viz., hereditary or acquired, it is found that the respondents with hereditary occupations like household industry, cultivation or agricultural labourers maintained a less favourable attitude than those who are in business, professions or government services. It is found that those in independent vocations like washerman, tailor, etc., also maintained a more favourable attitude than those in hereditary occupations. It is likely that some respondents who fall in the former category of occupation may be holding it as a hereditary occupation. The mean differences between the occupational groups are significant at .05 level as revealed by the F-ratio. Further analysis of the mean differences through the t-values revealed that the mean scores of those who are in business and trade differ significantly from those who are engaged as agricultural labourers, cultivators and in household industry, suggesting that those in business and trade maintain

TABLE 6a
t-values for the Mean Differences between Occupational Groups among Males and Females

MALES		FEMALES					
<i>Business and trade</i>	<i>Miscellaneous</i>	<i>Agricul- tural labourer</i>	<i>Cultivator</i>	<i>Business and trade industry</i>	<i>Miscellaneous</i>		
Agricultural labourer	3.13**	No occupation	2.30*	2.08*	—	2.22*	2.62
Cultivator	3.55**	2.10*	—	—	2.84**	—	—
Household industry	2.65**	Cultivator			2.68**	—	2.10*
		Business and trade				2.35*	3.80**
		Household industry					2.50*

*Significant at .05 level

**Significant at .01 level

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a more favourable attitude than the other compared occupational groups.

As for females, who have been classified into these categories of occupation based on their husband's occupation, it was found that those whose husbands are not occupied, in government services, and business and trade have a more favourable attitude and those whose husbands are engaged in household industry, cultivation, services, and agricultural labourers have a less favourable attitude. The mean differences are significant (.01 level) as revealed by the F-ratio. Further analysis of the mean differences through the t-values revealed that most of the occupational categories differ from each other significantly. Most of these females who belonged to the different occupational categories based on their husband's occupation differ from each other in their attitudes to child-rearing.

Between males and females in each of the occupational categories, the males have a more favourable attitude in all the occupational categories except in the government services and 'no occupation' category, where the females have a slightly more favourable attitude. None of these mean differences are significant except among agricultural labourers, cultivators and miscellaneous occupations. All this analysis in a way suggests that the nature of the husbands' occupation to some extent determines the type of attitudes of both the males and females towards child-rearing. The nature of the occupation, traditional or acquired, can breed in a different family climate in view of the varied social exposures and opportunities confronted by each of these occupations by virtue of the differential occupational status and functions. This exposure to a greater variety of social situations may orient the family in a different way than occupations where such opportunities are not available.

7. *Landholding*

Since landholding contributes to one's level of living, it was thought that it has a role to play in the attitude of the parents towards child-rearing. Table 7 gives information regarding the attitudes of males and females with different levels of landholding towards child-rearing.

TABLE 7

Total Family Landholding and Parental Attitudes towards Child-rearing among Males and Females

	MALES			FEMALES			t-values
	N	Mean	S.D.	N	Mean	S.D.	
Obtained score range	14-36			12-30			
No land	74	25.32	5.86	74	22.36	4.94	3.32**
1—2 acres	86	23.05	4.85	85	22.03	4.82	2.18*
2.01—5.00 acres	52	23.27	5.33	52	21.96	4.11	1.40NS
5.01—10.00 acres	48	24.04	6.59	48	22.37	5.02	1.40NS
10.01—15.00 acres	26	24.50	7.15	26	21.73	5.18	1.60NS
15.01 acres and above	57	24.77	6.25	57	23.72	4.78	1.01NS

F-ratio=1.68NS

F-ratio=1.14NS

NS=Not Significant

*Significant at .05 level ;

**Significant at .01 level

Among the males, those who have more than 10 acres of land have a more favourable attitude than those with less than 5 acres of land. However, it is found that those who own land have a less favourable attitude than those who do not have. This in a way suggests that owning land produces less favourable attitude than not owning it. However, the mean differences are not significant as revealed by the F-ratio.

Among the females, the trend of the results is slightly different. Those who own 15 acres of land or above, have a more favourable attitude than the others who have different levels of landholding. Here also the females who belong to the 'no land' category have a more favourable attitude than those who have up to 15 acres of land. The mean differences are not significant as revealed by the F-ratio. These results again suggest that those with no land seem to maintain a more favourable attitude towards children than those having some level of landholding. It is likely that owning some land brings in certain norms of behaviour aimed at regulating the future career of the children. This makes them to take care of the children in a way which will sustain or improve them to some level, as per the parental expectations, from what they are at the moment. But those people who have no land may not have any norms to guide the behaviour of the children as they may not be oriented to different roles in life by virtue of their present socio-economic status. It is likely

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that this position contributes to a sort of anomaly in their attitudes to children.

Between males and females, the males have a more favourable attitude than the females in all the categories of landholdings including the 'no land'. However, the mean difference is significant only in 'one to two acres' and the 'no land' category. The insignificant mean differences between the attitudes of males and females in the higher landholdings suggest that landholding does not bring about a differential attitude towards child-rearing among males and females.

8. *Value of Assets*

The estimated value of assets possessed¹ in each of the households was calculated in terms of rupees based on the existing rates and classified into four categories. The attitudes of the respondents belonging to these four categories have been studied.

TABLE 8
Value Assets (in Rupees) of the Family and Parental Attitudes to Child-rearing among Males and Females

	MALES			FEMALES			<i>t-values</i>
	<i>N</i>	<i>Mean</i>	<i>S.D.</i>	<i>N</i>	<i>Mean</i>	<i>S.D.</i>	
Upto Rs. 1000	32	25.25	6.83	32	21.06	5.05	2.30
1001—3000	87	23.79	5.21	87	21.44	5.51	2.80
3001—10000	111	23.52	4.78	111	21.95	4.54	2.51
10001 and above	112	25.07	5.00	112	23.39	5.15	2.32
Obtained score range	14-36			12-36			

TABLE 8a
t-values for the Mean Differences between Different Groups in General Assets of the Family among Males and Females

	MALES	FEMALES
	<i>Rs. 10001 and above</i>	<i>Rs. 10001 and above</i>
3001—10000	2.47	2.72
		<i>Rs. 1001—3000</i> <i>Rs. 3001—10000</i>
		2.12

1. Land, house, livestock, agricultural implements, gold, silver, deposits, insurance, etc.

Among males, the respondents with the assets valued at up to Rs. 1,000 have a more favourable attitude followed closely by those who have assets valued at Rs. 10,000 and above than the other categories in this variable. However, among females, those who have assets valued at Rs. 10,000 and above have a more favourable attitude than the others. The mean differences between the attitudes of the different categories of value of assets are significant both among males and females at .05 level as revealed by the F-ratios.

Further analysis of the mean differences among males show that the group with an asset valued above Rs. 10,001 differ significantly from those with assets valued at between Rs. 3,001 to Rs. 10,000. However, among the females, the respondents with assets valued at Rs. 10,000 and above differ significantly from those with assets valued at Rs. 1,001 to Rs. 3,000 and Rs. 3,001 to Rs. 10,000. However, the results obtained among males do not show any consistent trend regarding the attitudes as it is found that those with assets valued at upto Rs. 1,000 and these who have assets valued beyond Rs. 10,000 have, by and large, a similar favourable attitude. But among the females, the trend is somewhat consistent as from those who have assets valued at Rs. 1,000 to Rs. 3,000 to those who have assets valued at Rs. 10,000 and above maintain a progressively favourable attitude.

The comparison between the males and females in each of the categories of value of assets revealed that the males have a more favourable attitude than the females and the mean differences are also significant in all the categories. This suggests that the value of assets possessed do not influence the differential attitude maintained by males and females with regard to child-rearing.

CONCLUSION

The analysis of the results regarding the attitude of the rural parents towards child-rearing has revealed that the males, the high socio-economic status group, those with higher income and with acquired occupations like government services, business and trade, professions and those who belonged to the caste groups like Muslims, Christians and high caste, maintain a more favourable attitude to

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wards child-rearing than those who belong to lesser levels in each of these variables. As far as the value of assets is concerned, males with assets valued at Rs. 1000 and also Rs. 10,000 and above have a more favourable attitude than those in the other levels. However, the females with assets valued at Rs. 10,000 and above have a more favourable attitude than those in the other levels.

With regard to age among males, the higher age group (31 years and above) have a more favourable attitude than those in lower age group (20 years and below).

In the general comparison between males and females and also in all other comparisons in each of the variables, it was found consistently that males have maintained a more favourable attitude than the females. However, the mean differences are not significant in certain categories or levels in each of the variables studied. This result is indicative of a less favourable attitude among the females towards child-rearing practices regardless of the nature of the socio-economic conditions that prevail in their home environment. It is likely, as pointed out earlier, that the traditional values which is very much in the nature of the Indian woman fosters an attitude which is in keeping with the traditional structures regarding the upbringing of the children.

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A Factorial Study of the Personality Traits of Popular Teachers

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The present study was undertaken with a view to identify the personality traits that differentiate popular teachers and to find out the common factors in the differentiating traits through factor analysis.

In general, it seems a fair assumption that teachers whom learners like best are those who have the best interaction with pupils and, therefore, the potentiality for greater success in teaching. This assumption is supported by Hart's pioneer study (1934) who among the interesting data found that 80 per cent pupils of his sample of study said that the teacher they liked best was also their most effective teacher. Brookover (1940) was able to show that teachers who show a high degree of person-to-person interaction with many students tend to be rated high with respect to general teaching competence. Studies (Morse and Wingo, 1968) show that well-liked teachers, popular with their students, make well-liked subjects; that the subjects taught by well-liked school teachers are voluntarily continued by students, while subjects taught by disliked teachers are continued only if they are required. Martin and Stendler (1953) in their comments on the findings of the researches in the field of

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child development and learning, remark that if there is acceptance of the teacher by the pupil and if the learning situation is rewarding one, then the pupil learns from teacher. Wickman (1928) in an investigation of the behaviour problems of children showed that disorders or behaviour difficulties in the classroom were produced more by the teachers, and that they could not be accounted for merely in terms of the attributes of children themselves. The children imitate the behaviour of an admired teacher and they do not imitate the behaviour of a teacher whom they dislike. Klausmeier (1961), too, is of the opinion that students seek help from a respected and admired teacher in solving a variety of problems originating in the home, neighbourhood and school. Thus, the educational institutions do need a large number of teachers with personality traits that may be liked and admired by pupils in view of the importance of such teachers in the educational matrix. For this it is needed to know the personality traits that differentiate popular teachers from those not liked by the pupils, so that these traits may be looked for at the time of recruiting people for teacher-training or teaching jobs.

The Present Study

The present study was undertaken with a view to identify the personality traits that differentiate teachers who are popular with their students and to find out the common factors in the differentiating traits with the help of factorial analysis.

METHODS

Sampling

The sampling was done in two phases:

(i) *Sampling for identification of differentiating personality traits of popular teachers.* The term popular is generally used both by laymen and social scientists. In common language a person popular in a particular group is one who is admired or liked 'generally' by persons of the group. Since the concept 'generally' is vague, it was decided to make it objective by fixing a proportion the liking of which would be called the liking of the people in 'general'. It was decided that a teacher be considered to be 'popular' with a group of students when he is liked by at least 80 per cent of the

group. The teachers at the other extreme, that is, those liked by only 20 per cent or less to be 'not popular' with that group of students.

Twenty high and higher secondary schools were randomly selected from the State of Haryana. It is important to mention here that some higher secondary schools do not run seventh class and there is no such class as eleventh in high schools. Hence, it was decided to take only eighth, ninth and tenth classes of the selected schools in the sample. The clusters of all the students on rolls of these classes were selected in the school chosen.

The students were asked to write the names of five teachers whom they liked the most on a proforma supplied to them by the investigator. They were directed not to write down their own names or roll numbers on the proformas to enable them to give their frank and sincere opinion. The investigator supervised the process of filling the proformas by the students personally. It was done confidentially and in the absence of any member of the teaching staff of the institution. This helped the students to think freely in a calm and congenial atmosphere of their classroom setting. The same procedure was applied in all the twenty selected schools. The total number of the students from whom the opinion regarding the popularity of the teachers was sought came out to 6677.

All the 6677 proformas were arranged school-wise in 20 piles, each pile representing one school. The number of the students, who had shown likings for a particular teacher on the proformas, were recorded by making tally marks against the name of each teacher. The tallies were totalled for all the teachers, named on proformas by the students, school-wise for all the twenty schools separately. The total tallies of all the teachers were converted into percentages. The teacher who was liked by 80 per cent students or more was designated as 'popular' and the teacher who was liked by 20 per cent students or less as 'not popular' in the school. The total number of the 'popular' teachers came out to be 124 and that of the 'not popular' ones to 100 only. To make the computation somewhat easier, it was decided to keep the number at 100 in both the groups and so 24 teachers were weeded out randomly from the group of 124 popular teachers. But these were put back in the sample in the

second phase for computing the correlations.

(ii) *Sampling for computing correlations between the differentiating personality traits.* The sample of 124 popular teachers was further increased to 200 for the purpose of computing correlations by selecting eleven more schools randomly from the State of Haryana. The total number of students in eighth, ninth and tenth classes of these schools from whom the opinion regarding the popularity of teachers was sought came out to be 4,413. The 124 teachers who came out to be popular in the first phase could have formed the complete group for correlating the scores obtained by them on differentiating personality traits, but it was thought that this number may lead to greater margin of error in the correlations which were going to be the bases for all further computations. It may be pointed out that the smallness of number in the first phase was not harmful as the formula for testing the significance of difference between the means does take cognizance of the size of N's and make due amends if they are small, by increasing the S.E. of the difference and consequently demanding a larger difference between the means to be significant.

Tool

Sixteen Personality Factor Questionnaire (16PF) of Cattell was used to identify the differentiating personality traits of popular teachers. Coverage of personality by this test is ensured by the sixteen functionally independent and psychologically meaningful dimensions. Each of the sixteen scales brings an entirely new piece of information about a person. The investigators Warburton, Butcher and Forrest (1963) have found that some traits of the 16PF Test can be fair predictors of teaching success and this they regarded as of significant promise to suggest their use as part of selection procedures.

Procedure

(a) *Identification of the differential traits of popular teachers.* The 16 PF Test was administered to 100 popular and 100 not popular

TABLE 1

Significance of the Difference Between Mean Scores of the 'Popular' and the 'Not Popular' Teachers on Sixteen Cattell's Traits

Factor or Trait	Description of the Factor	POPULAR TEACHERS (N=100)		NOT POPULAR TEACHERS (N=100)			
		Mean	S.D.	Mean	S.D.	Mean Dif- ference	C.R.
A	Reserved <i>Vs.</i> Outgoing	9.91	2.86	6.58	3.28	3.33	7.63*
B	Less Intelligent <i>Vs.</i> More Intelligent	7.32	2.31	3.76	2.10	3.56	11.44*
C	Affected by Feelings <i>Vs.</i> Emotionally Stable	15.28	3.57	8.48	4.55	6.80	11.78*
E	Humble <i>Vs.</i> Assertive	12.50	3.48	12.64	2.46	0.14	0.33
F	Sober <i>Vs.</i> Happy-go-Lucky	10.99	3.68	12.32	2.28	1.24	2.87*
G	Expedient <i>Vs.</i> Conscientious	14.32	2.99	7.23	1.90	7.09	20.08*
H	Shy <i>Vs.</i> Venturesome	15.32	4.24	8.36	5.27	6.96	10.28*
I	Tough-minded <i>Vs.</i> Tender-minded	10.48	3.32	12.68	4.01	2.20	4.22*
L	Trusting <i>Vs.</i> Suspicious	9.00	2.77	8.92	2.01	0.08	0.23
M	Practical <i>Vs.</i> Imaginative	12.12	2.47	12.59	2.83	0.47	1.05
N	Forthright <i>Vs.</i> Shrewd	11.27	3.07	9.50	2.66	1.77	4.36*
O	Placid <i>Vs.</i> Apprehensive	10.01	4.14	14.96	4.60	4.95	8.01*
Q ₁	Conservative <i>Vs.</i> Experimenting	7.74	2.50	7.65	3.94	0.09	0.19
Q ₂	Group-dependent <i>Vs.</i> Self-Sufficient	10.14	2.76	10.28	2.04	0.14	0.41
Q ₃	Undisciplined self conflict <i>Vs.</i> controlled	12.22	2.92	7.37	2.97	4.85	11.66*
Q ₄	Relaxed <i>Vs.</i> Tense	9.56	4.74	14.07	4.41	4.51	6.97*

*Significant at .05 level

teachers. The test data were collected. The means and S.D.'s were calculated separately for each group on each trait of the test. Then the significance of the difference between the mean scores of the two groups of teachers on different trait measurements was tested against the null hypothesis of 'no difference' by calculating the standard errors of the differences and the C.R.'s. A C.R. value of 1.96 or more rejected the null hypothesis at .05 level of significance. The different values of means, S.D.'s and C.R.'s are given in Table 1.

The significantly different mean scores of popular teachers were found to lie on the underlined poles of the following differentiating traits (cf. Table 1).

(1) A. Reserved	<i>Vs. Out-going</i>
(2) B. Less intelligent	<i>Vs. More intelligent</i>
(3) C. Affected by feelings	<i>Vs. Emotionally stable</i>
(4) F. Sober	<i>Vs. Happy-go-lucky</i>
(5) G. Expedient	<i>Vs. Conscientious</i>
(6) H. Shy	<i>Vs. Venturesome</i>
(7) I. <i>Tough-minded</i>	<i>Vs. Tender-minded</i>
(8) N. Forthright	<i>Vs. Shrewd</i>
(9) O. <i>Placid</i>	<i>Vs. Apprehensive</i>
(10) Q ₈ Undisciplined Self Conflict	<i>Vs. Controlled</i>
(11) Q ₄ <i>Relaxed</i>	<i>Vs. Tense</i>

(b) *Extraction of common factors.* Though Cattell (1962) has labelled his personality traits as primary and called them functionally independent, yet they are not likely to be so in all the groups, especially in the well defined ones with a strong common characteristic attribute like amiability of a popular teacher. Thus to extract common factors in the eleven differentiating Cattell's personality traits of popular teachers, fifty-five inter-correlations were computed between these traits, which are given in Table 2.

A number of procedures for factor analysis to extract common factors have been proposed. In view of the disadvantages of the methods of 'Principal Components' and 'Maximum Likelihood' with respect either to psychological interpretation or calculations, it was decided to use the 'Centroid Method' of Thurstone for the factor analysis of the correlation matrix.

TABLE 2
Correlations Between Differentiating Traits

Trait	A	B	C	F	G	H	I	N	O	Q ₃	Q ₄
A	X	.02	.06	.19	.22	.27	.07	.11	.05	.17	-.09
B	.02	X	.03	-.07	.32	.11	-.11	.13	-.02	.19	-.11
C	.06	.03	X	-.02	.22	.35	-.23	-.03	-.38	.26	-.51
F	.19	-.07	-.02	X	-.29	.27	-.06	-.11	-.25	-.16	.08
G	.22	.32	.22	-.29	X	.10	-.03	.25	-.12	.13	-.25
H	.27	.11	.35	.27	.19	X	-.11	.02	-.25	.18	-.37
I	.07	-.11	-.23	-.06	-.03	.11	X	.04	.20	-.10	.17
N	.11	.18	-.03	-.11	.25	.02	.04	X	.04	.04	-.08
O	.05	-.02	-.38	.25	-.12	-.25	.20	.04	X	-.12	.62
Q ₃	.17	.19	.26	-.10	.13	.18	-.10	.04	-.12	X	-.32
Q ₄	-.09	-.11	-.51	.08	-.25	-.37	.17	-.08	.02	-.32	X

For the first round of analysis the communalities at the beginning and after extraction of each factor were guessed to be the highest correlations in the columns of the correlation matrix in Table 2 and the subsequent residual matrices. Thus, the communalities were changed after the extraction of each factor. After the first round of analysis the difference between the guessed and the obtained communalities in some of the factors was more than .10. Hence, the factorisation was done afresh, starting with these new communalities without making any adjustment in the diagonal cells subsequently. It was found that the communalities that were obtained from the factor matrix after the very first reiteration became stable, that is, they did not differ by more than .10 from the communalities with which the factorisation was started the second time. None of the differences was more than .0574 and this was considered to be satisfactory in the light of the remarks of Guilford that "if the discrepancies are as large as .10, either positive or negative, we do well to start the extractions all over again, using new guesses based on the computed communalities we found the first time through" (1954, p. 494).

The analysis was stopped after Factor IV in the first round because seven loadings of the Factor V fell short of Guilford and Lacey's criterion. They stopped factorizing, "when the product of

two highest factor loadings falls below $\frac{1}{\sqrt{N}}$ (Thomson, 1951 p. 122). Six loadings out of eleven of Factor V also fell below twice their standard errors determined by Empirical Formula of Burt (Thomson, p. 123), and Thomson says, "If half the loadings of a factor fall below twice their standard errors thus found, Vernon recommends rejection of the factor" (Thomson, p. 123). Hence, the Factor V was rejected and the factorization was carried up to four factors in the first subsequent reiteration also. The loadings after the first reiteration are given in the Table 3.

TABLE 3
Factor Matrix (After First Reiteration)

TRAIT	FACTORS			
	I	II	III	IV
A	.22	.40	.28	-.22
B	.31	.26	-.20	.19
C	.56	-.23	.25	.17
F	-.20	.18	.57	.10
G	.56	.26	-.36	.14
H	.47	.19	.48	.10
I	-.21	.16	-.10	-.27
N	.18	.23	-.22	-.00
O	-.58	.58	-.03	.07
Q ₃	.43	.02	.03	-.08
Q ₄	-.74	.20	-.18	.13

It was seen after the first reiteration that even the loadings of the Factor IV decisively fell below the lower limit set by Guilford and Lacey, and satisfied Vernon's criterion set for the rejection of a factor. But this factor too was included in the rotation that followed as a residual factor to help the interpretation.

(c) *Rotation of reference axes.* Psychologists differs vigorously on the question of rotation. Thurstone and his followers hold rotation to be essential for psychological interpretation of factors. In order to give meaning and fixity to the factor pattern for interpretation Thurstone (1947, p. 335), introduced the idea of rotation to 'Simple Structure'. Simple structure can be orthogonal or oblique,

depending on the fact whether the reference axes have maintained their 90° separation and their independence after rotation or not. Mostly psychologists prefer orthogonal rotation because so long as factors are orthogonal, the loadings in the matrix of factor loadings are also the correlations between the factors and the tests. In the present case, the factor matrix shown in Table 3 did seem to admit an orthogonal simple structure, since the spread of test dots, when plotted in six pairs of reference frames of the four primary axes, showed that orthogonal rotation was possible. Hence, the axes were rotated orthogonally to simple structure in four dimensions using the 'Method of Two Dimensional Sections'. Loading up to .20 were treated as insignificant for attaining the simple structure. The final fifth Rotated Factor Matrix is represented in Table 4.

TABLE 4
 Rotated Factor Matrix

TRAIT	FACTORS			
	I	II	III	IV
A. Reserved Vs. Outgoing	.548	— .287	.050	.042
B. Less Intelligent Vs. More Intelligent	.190	.117	.397	— .104
C. Affected by feelings Vs. Emotionally Stable	.372	.548	— .050	.127
F. Sober Vs. Happy-go-lucky	.294	— .127	— .473	— .328
G. Expedient Vs. Conscientious	.259	.231	.639	— .035
H. Shy Vs. Venturesome	.071	.195	— .102	— .030
I. Tough-minded Vs. Tender-minded	— .095	— .364	.052	.093
N. Forthright Vs. Shrewd	.102	— .080	.349	.043
O. Placid Vs. Apprehensive	— .090	— .650	.004	— .498
Q ₃ Undisciplined Self-conflict Vs. Controlled	.300	.183	.172	.106
Q ₄ Relaxed Vs. Tense	— .445	— .506	— .074	— .455

Interpretation of Factors

Actually situations, original and those derived consequently from rotations suffer in all analyses from the error component of the original R-matrix based on a given sample. This factor has been considered by Thurstone (1947, Preface vii), also and he says that we cannot afford to be too much concerned with "numerical

minutiae" which may lead one astray from conceptual formulation that constitute the real goal. Guilford (1954, p. 508), too advises us to ignore values below .10 or more in practical situations and treat them as zero loadings. Hence, in view of these situations loadings above .30 were treated as substantial for interpretation that follows.

Factor I. Factor I has pretty high positive loadings of .671 and .548 in the tests measuring traits II(Shy Vs. Venturesome) and A(Reserved Vs. Outgoing) respectively, followed by substantial loadings of .372 and .300 in C(Affected by feelings Vs. Emotionally stable) and Q₁(Undisciplined self-conflict Vs. Controlled) respectively. On the other hand, this factor has substantial negative loading of -.445 in the test measuring trait Q₂(Relaxed Vs. Tense). Its loadings in the other traits are less than .30 and, hence, of no value according to the criterion accepted above for interpretation.

The trait in which this factor has more than .30 positive loadings have the following poles at the upper ends: (i) Out-going, (ii) Emotionally stable, (iii) Venturesome, (iv) Controlled. On the other hand, the lower pole of the only trait in which this factor has a substantial negative loading of more than .30 is represented by the attribute of being: (v) relaxed.

This means that the common of factor under consideration represents something which is common in all the five attributes mentioned above, and in order to give a suitable name to it we have to look for this common denominator. Some help in searching out the name may also be got from the attribute that has the highest loadings of this factor, that is, "Venturesomeness". In view of these considerations it will be appropriate to call this factor, a factor of "Striving". It is a positive trait which makes a man capable of seeking new avenues for fulfilment in spite of the risks involved. It appears to make an individual pushing to seek success.

Summing up, in the context of the personality of a teacher it may be said that the teacher having a good amount of this common factor in his personality will be ready to try new experiments with his pupils in matters of maintenance of discipline, assessment, teaching techniques, etc., will be emotionally responsive to his pupils in a placid manner without being exuberant and will be able to give

proper leadership to the social group of the class. All these attributes seem to constitute popularity.

Factor II. Factor II has high pretty negative loading of $-.650$ and $-.506$ in tests measuring traits O (Placid Vs. Apprehensive) and Q₁ (Relaxed Vs. Tense) respectively followed by a substantial loading of $-.364$ in I (Tough-minded Vs. Tender-minded). It has the only substantial positive loading of $.548$ in E (Affected by Feelings Vs. Emotionally Stable).

The traits in which this factor has more than $.30$ negative loadings have the following poles at the lower ends: (i) Tough-minded, (ii) Placid, (iii) Relaxed. On the other hand, the upper pole of the only trait in which this factor has a substantial positive loading of more than $.30$ is represented by the attribute of being: (iv) Emotionally Stable.

This means that the common factor under consideration represents something which is common in all the four polar attributes mentioned above. Some help in finding out the name may also be got from the attribute that has the highest loading of this factor, that is, 'placidity'. In view of all these considerations it will be appropriate to call this factor, a factor of 'Self-Confidence'. It represents a well knit personality. It appears to make an individual self-reliant and realistic.

Hence, it may be concluded that the teacher having a good amount of this common factor in his personality will be practical and confident. He will also tend to be firm in his dealings, but his firmness will be tempered with placidity and calmness. It has been brought out by Hart (1934) that teachers who are somewhat firm, calm and confident, but not harsh, are liked by their students.

Factor III. Factor III has pretty positive loading of $.639$ in the test measuring trait G (Expedient Vs. Conscientious) followed by substantial loading of $.397$ and $.349$ in B (Less intelligent Vs. More intelligent) and N (Forthright Vs. Shrewd) respectively. On the other hand, this factor has substantial loading of $-.473$ in test measuring trait F (Sober Vs. Happy-go-lucky).

The traits in which this factor has more than $.30$ positive loadings have the following poles at the upper ends: (i) More Intelligent, (ii) Conscientious, (iii) Shrewd. The lower pole of the only

trait in which this factor has a substantial negative loading of more than .30 is represented by the attribute of being: (iv) Sober.

In order to give a suitable name to this factor we have to look for a denominator common in all the four attributes mentioned above. Some help in hunting out the name may also be got from the attributes that has the highest loading of this factor, that is, 'Conscientiousness'. In view of these considerations this factor may be called a factor of 'Ability and Perseverance'. Perseverance makes ability functional; it is like its lubricant. A teacher who has a good deal of this common factor in his personality is likely to be intelligent, conscientious and objective.

Factor IV. Factor IV has pretty high negative loading of $-.498$ in the test measuring trait O (Placid Vs. Apprehensive) followed by substantial loadings of $-.455$ and $-.328$ in tests measuring traits Q₁ (Relaxed Vs. Tense) and F (Sober Vs. Happy-go-Lucky), respectively.

The traits in which this factor has more than .30 negative loadings have the following poles at the lower ends: (i) Sober, (ii) Placid, (iii) Relaxed. This means that this factor represents something which is common in all the three negative polar attributes mentioned above. Some help in searching out the name may also be got from the attribute that has the highest loading of this factor, that is, 'Placidity'. In view of these considerations this factor may be called the factor of 'Calmness'. This is a factor of serenity alone. In the context of the personality of a teacher it may be said that serenity and calmness seem to be conducive to congenial relationship between the teacher and the taught.

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On Representation in Short-Term Memory

A Developmental Study

T. S. Saraswathi

This study of developmental changes in short-term memory includes: (a) an investigation into the effect of three different modes of presentation of stimuli (motor, visual and verbal) on the short-term memory (STM) of children at three age-levels (K.G., Class III, and Class VI); (b) an investigation into the effect of three types of interference tasks (motor, visual and verbal) on each of the three modes of presentation; and (c) an investigation into the interactions, if any, between the mode of presentation, the interference tasks and the age of the subjects.

One of the issues that has attracted much attention of the developmental psychologists in recent years has been concerning the

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ways in which a child's experiences with his world are encoded and stored. The cognitive developmental theories proposed by Piaget (1954) and Bruner (1966) have made a particularly significant impact in this direction.

Commenting on the developmental aspects of memory, Piaget (1968) says:

It is customary to represent memory as a system of coding and decoding, which naturally assumes the intervention of a code. But, curiously enough, this code itself has been studied very little, as if it were taken for granted that the code stays the same throughout development.... On the other hand.... the most likely hypothesis is that the memory code... is modified during development, and depends at any given moment on the subject's operational level (pp. 1-2).

While differences may exist in their formulations, both Piaget's and Bruner's theories recognize three modes of representation: action (sensory motor or enactive representation), image (ikonic representation), and symbol (symbolic representation). That these three media can be considered as important landmarks in development is brought out in Bruner's words:

At first the child's world is known to him principally by the habitual actions he uses for coping with it. In time there is added a technique of representation through imagery that is relatively free of action. Gradually, there is added a new and powerful method of translating action and image into language, providing still a third system of representation (Bruner, 1966, p.1).

Bruner particularly emphasizes that the three representational systems are parallel and each is unique, but also capable of partial translation, one into the other, accounting for the impulsion to cognitive growth.

Attempts to study the proposition of developmental changes in the mode of representation and its functional significance for learning and memory, have resulted in interesting, if somewhat contradictory findings. This is not surprising considering the complexity of the theory regarding the development of representation. Selected researches in the area have been reviewed by a number of leading workers in the field (Flavell, 1970, Rohwer, 1970; Reese, 1970; Paivio, 1970). Vast differences in methodology, age of Ss and

materials used in different studies makes comparisons difficult and of limited value.

A review of literature in field suggests the possibility of a developmental study of short-term memory using different modes of presentation and interference tasks.

The overall aim of the present investigation is to study the developmental changes in short-term memory. This includes: (a) investigations of the effect of three different modes of presentation of stimuli (motor, visual and verbal) on the short-term memory (STM) of children at three age levels (K.G., Class III and Class VI); (b) investigations of the effect of three types of interference tasks (motor, visual and verbal) on each of the three modes of presentation for the three age-groups; and (c) investigations of interactions, if any, between mode of presentation and interference tasks and the age of the subjects.

Theory and available empirical evidence suggest that there may be developmental differences in the facilitative effects of modality on STM performance. Available information also indicates that there may be developmental differences in the effect of different types of interpolated tasks on the STM of children. Finally, it is hypothesized that there will probably be a significant increase in STM capacity with increasing age, as revealed in memory performance.

METHOD

Study I

Subjects. Fifty-four *Ss* participated in this study, 18 from each of three grades—K.G., Class III and Class VI. All the children were enrolled in David Edwards Elementary School, Ames, Iowa, U.S.A., with the exception of one Mexican boy who was fluent in English, all the *Ss* were white Caucasian. There were equal number of boys and girls at each grade level. The mean age of the *Ss* at each grade level was—Grade K.G.: 5 years, 7.5 months; Grade 3: 8 years, 8.5 months; Grade 6: 11 years, 9.5 months. Three boys and three girls at each grade level were randomly assigned to one of the three experimental groups. Three of the initially selected *Ss*

from grade K.G. had to be replaced by three others because of lack of sustained attention.

Design. With three modes of stimulus presentation (verbal, visual, and motor) and three types of interpolated activities (verbal, visual and motor), there were nine treatment combinations. For practical reasons it was decided to limit the number of experimental sessions per child to three. Since the within-subjects interactions were of particular interest in this study, a partially balanced incomplete block design was used, resulting in three experimental groups at each age level. The design of the study is presented in Table 1.

TABLE 1
Experimental Design : Study I

Mode of Interference	Mode of stimulus presentation		
	VERBAL	VISUAL	MOTOR
Verbal	Group 3	Group 2	Group 3
Visual	Group 3	Group 1	Group 1
Motor	Group 2	Group 2	Group 1

There were three boys and three girls at each grade level in each experimental group. The order of presentation of treatments within the experimental groups was counterbalanced.

Stimulus Materials. In order to make the stimulus materials for the verbal and visual modes of presentation clearly distinct abstract words and abstract line drawings were used in Study I.

The abstract words were: Life, Truth, Hope, Cost, Time, Length, Idea, and Trouble. Out of these, a subset of five words was chosen randomly for each of the 20 trials. The words were chosen from a list of 16 abstract nouns used by Paivio and Yuille (1966). All the words have a Thorndike-Lodge (1944) AA rating and are reported as low in imagery and high in meaningfulness across the elementary grade levels (Paivio & Yuille, 1966).

Eight black and white line drawings of abstract figures comprised the memory set for the visual mode. The drawings were mounted on 5×3.5 inch cardboard pieces. Six of these difficult-to-label stimuli had been used by Kingsley and Hagen (1969) with

preschool children. A subset of five randomly chosen drawings was used for each trial.

For the motor mode, eight geometrical designs cut out on a 9×3×.12 inch cardboard pieces were used. These could be mounted vertically on a wooden block with a groove in the centre. As in the verbal and visual mode, a subset of five designs, randomly selected, was used for each trial.

The materials for the interpolated activities consisted of: (a) A list of words acoustically similar to those included in the memory set (verbal interference); (b) a set of the line drawings, visually similar to but not included in the memory set (visual interference); (c) a geometrical design cut out on 12×4×.12 inch cardboard piece (motor interference).

Procedure. Each subject was tested individually in three experimental sessions. Each session consisted of two practice and 20 experimental trials of a specified mode. The presentation time was approximately 20 minutes. For 10 of the 20 trials, the presentation of the memory set was followed by immediate probe recall test. For the remaining 10 trials, a specified interference activity was introduced for eight sets between presentation and recall. The trials with and without interpolated activity were randomized in order of presentation. Each serial position was tested four times every session.

The general procedure for all three modes of presentation was kept as similar as possible. Five black cards were placed in a row in front of *S* for the verbal and motor conditions, so that *S*'s response always consisted of pointing to the card in the correct position. Order of presentation was from *S*'s left to right.

Specific Procedures. Visual Mode of Presentation. The procedure used for the visual mode of presentation was essentially a replication of Atkinson, Hansen and Bernbach, (1964) procedure. The memory set consisted of eight abstract line drawings. On each trial, a subset of five cards was randomly selected and shown one at a time at a 3-sec. rate. After each card was shown to *S*, it was placed face down on the table, so that after all five cards were presented, they formed a horizontal row in front of *S*. For trials with immediate recall, a cue card identical to one of the cards presented on that trial was then placed face-up on the table and *S* asked

to indicate the card that would match the cue card. For trials with interpolated activity, an interference in a specified mode was introduced between presentation of the memory items and the cue card. When incorrect in the first choice, *S* was asked to make a second choice after which, if necessary, the correct card was shown by *E*.

Verbal Mode of Presentation. The procedure was similar to that used in the visual mode of presentation, except that five abstract words were read aloud by *E*. A row of five black cards ($5 \times 3\frac{1}{2}$) inch was placed in front of *S* and *E* pointed to one card at a time while reading out the words. The cue word was spoken by *E* and *S* asked to indicate the card in the row with which the word was associated.

Motor Mode of Presentation. As in the verbal mode, a row of five blank cards was placed in front of *S*. The memory task consisted of associating a specific motor movement with a card in each of the five positions. One geometrical design at a time was mounted on a wooden block and *S* asked to trace it with a pencil. As *S* finished tracing each design *E* pointed to the blank card with which it was to be associated. The cue card was one of the geometrical designs presented during a given trial. The *E* mounted the design on the wooden block and asked *S* to trace it. *S* was then asked to indicate the card with which the design was associated.

Scoring. Every correct first and second choice response was given a score of '2' and '1' respectively.

Study II

Subjects. Twelve children, two boys and two girls from each of the three grade levels (K, 3 and 6) participated in Study II. Of the twelve, six children (one boy and one girl from each age group) had participated in Study I and were chosen on the basis of high performance and motivation (Group I). The other six children participated only in Study II (Group II). All *Ss* were enrolled at David Edwards Elementary School, Ames, Iowa. With the exception of one boy from Hawaii who was fluent in English, all *Ss* were white Caucasian. The mean age of the *Ss* at each grade level was—Grade K: 6 years; Grade 3: 8 years, 7 months; Grade 6: 11 years, 6 months.

Design. A complete within Ss design was used. Each child was tested on all the 3×3, Modality×Interference combinations. For Group I Ss who had participated in Study I and for whom data was available on three treatment combinations, data on the remaining treatments was collected in four additional sessions. For Group II, data was collected in 6 sessions, one session per day.

Procedure. The stimulus materials used and the procedure were identical to those used in Study I.

RESULTS AND DISCUSSION

Age Differences in Memory Performance

There was a significant increase in memory performance with the increasing age in both studies (Study I: $F(2,36)=53.38$, $p < .001$; Study II: $F(2, 6)=42.36$, $p < .001$). The mean recall for both studies are presented in Table 2. Comparisons among these means using the Newman-Keuls procedure (Snedecor &

TABLE 2
Age Differences in Mean Recall Scores

	AGE (GRADE)		
	5-6 (K)	8-9 (Gr. 3)	11-12 (Gr. 6)
Study I	8.29	11.28	14.81
Study II	8.65	10.60	16.06

Cochran, 1967; p. 273), indicated that the children in the sixth grade performed significantly, better than children in the two lower grades. The difference between recall scores of K.G. and third graders was significant in Study I but not in Study II.

The differences in performance among the age groups is not surprising in that it has been documented in many other studies (e.g., Atkinson, *et al.*, 1964; Hansen, 1965; Neufeldt, 1966).

Developmental studies using many different types of materials, and methods of presentation, have generally agreed in showing that STM increases over a wide age range. Atkinson, *et al.* (1964) found that 5-year-olds scored a higher proportion of correct first-choice responses over all serial positions than did 4-year-olds. The ten-year-olds in Hansen (1965) study made more correct choices at all

retention intervals than their 5-year-old Ss. Neufeldt (1966) found a significant age main effect, which resulted from the better overall performance of the 13-year-old Ss when compared to the 8-year-olds in a dichotic listening task. Supportive evidence also comes from Belmont (1967) using Ss from 8 years to adulthood. Improved performance with age was observed in both the perceptual STM (Belmont, 1967) and Verbal STM tasks (Belmont & Butterfield 1969). More recently Keely, (1971) has reported significant improvement with age on all four STM tasks used in her study. In her study, a visual STM task with easy- or hard-to-label displays and with or without repetition of stimuli over trials was used with 4-, 8-, and 14-year-old Ss.

While the design of the present investigation does not permit analyses of whether the observed age differences are due to differences in memory storage capacity or due to differences in strategies used for acquisition and retrieval, the latter possibility cannot be overlooked.

Sex Differences in Memory Performance

No significant sex difference in memory performance was observed in either Study I or Study II ($F < 1.0$). Nor did sex interact significantly with the other independent variables namely, Age, Mode, and Interference.

Interference Effects

The over-all significance of interference effect was observed in both Study I and II (Study I: $F(1, 36) = 52.85$, $p = .001$; Study II: $F(3, 18) = 9.03$, $p < .01$). Thus, interpolated activity between presentation and recall significantly lowered memory performance. It must be remembered that delay was confounded with interference in the present investigation. Comparisons among the means (Newman-Keuls) in Study II indicate significant differences between all possible comparisons and that the visual interference caused maximum forgetting. Motor interference had the least interfering effect. A similar trend was observed in Study I also.

The interaction between age and interference effects was not significant. The absence of statistically significant interaction between age and interference is of particular interest here as it corroborates the existing evidence on the relation of forgetting rate to development. Although this investigation was not specifically designed to study age differences in forgetting rate as such, some observations regarding the same appear relevant here.

As Belmont and Butterfield (1969) have pointed out evidence from studies testing STM over two or more retention intervals show no reason to believe that forgetting rate is related to development. Related evidence comes from studies using either an unfilled interval or intervals filled with some interpolated activity between item presentation and test (Atkinson *et. al.*, 1964; Hansen, 1965; Macoby and Hagen, 1965; Belmont, 1967). In the present investigation the retention interval was filled by any one of the three rehearsal preventing activities (motor, visual or verbal). Although it is risky to infer from negative findings, evidence from the present investigation and from those cited above seem to converge, indicating absence of developmental differences in the rate of forgetting.

Presentation Mode Effects

The mode main effect and the interaction of mode with age failed to reach statistical significance in both Study I and Study II.

It has been mentioned earlier that research evidence on the developmental primacy of any mode is quite chaotic at present. The negative finding in the present investigation, therefore, is not surprising. Most of the evidence on this controversial issue of change in modality preference with age, comes from the work of Rohwer and his associates (See Rohwer, 1970 a and 1970 b for detailed discussion). Rohwer's main hypothesis is that the degree to which the visual mode is dominant over the verbal increase with age. Experimental support for this hypothesis are drawn by Rohwer (1970 a) from his own data and from his reinterpretation of Dilley and Paivio (1968) data, showing that the superiority of pictorial items over verbal items increases with age. This interpretation runs counter to Bruner's (1966) view that the ikonic modes of representation

have a developmental priority over the verbal modes of representation. Rohwer (1970 a) suggests that language is a coherent system which is easier to use. Hence, it follows that the verbal mode of representing and storing information has developmental primacy.

Paivio (1970) has suggested that the age trends observed for the difference between word and picture materials reflect a developmental shift in decoding facility rather than in storage modes. A somewhat similar position was held by Corsini, Jacobus and Leonard, (1969) who suggested that the apparent increases in the superiority of the visual mode are an artifact of the practice of requiring subjects to respond verbally when tested for recall of pair members presented as pictures. Using a recognition paired-associate paradigm, Corsini, *et al.*, (1969) found that preschool children showed better recognition memory for pictures than for words. They concluded that:

...young children are better able to encode pictorial input but have difficulty when the task requires them to translate their ikonik representation into a verbal response. Thus even though the young child may be better able to encode pictorial information, pictorial information will facilitate performance only when certain response opportunities are available, but will hinder performance, when other responses are called for (p. 193).

The position held by Paivio (1970) and Corsini *et al.*, (1969) regarding the superiority of the visual mode, however, differs in that Paivio suggests that the visual mode of representation is predominant at all ages, whereas Corsini *et al.*, (1969) working primarily with preschool Ss suggest that the visual mode has developmental primacy.

In the present investigation, while the analysis of the combined scores (immediate recall score+recall score with interpolated activity) fails to reveal the dominance of any one mode, an examination of the means for immediate recall alone for visual and verbal modes does suggest some trends. The means for the immediate recall across, verbal and visual, for the three age groups are presented in Table 3.

For the mean values presented in Table 3, in Study I the data for the visual and verbal modes of presentation came from different Ss while in Study II this was within-subject variable. The data

ON REPRESENTATION IN
SHORT-TERM MEMORY

TABLE 3
*Mean Immediate Recall Scores for Visual and Verbal Modes of
Presentation*

GRADE	STUDY I		STUDY II	
	<i>Modality</i>		<i>Modality</i>	
	Visual	Verbal	Visual	Verbal
K. G.	8.42	10.00	7.00	13.25
III	11.17	14.01	11.25	13.50
VI	15.25	15.80	15.75	18.25

(Table 3) indicate that at all these grade levels the scores on the verbal mode are consistently higher. When the two extreme grade levels (K and 6) are compared, the difference between the visual and verbal mode for the kindergarteners appears to be greater than it is for the 6th grade children. With the data available from the present investigation, except for indicating such a trend, no definite conclusions are possible.

Since abstract pictures and abstract words (low imagery) were used as stimulus material, it is quite possible that with their superior verbal facility, the 6th graders easily labelled the abstract pictures thus making the two modes equivalent for all purposes. In fact, the post-experimental interview suggests just such a possibility. Most of the 6th grade children reported giving specific labels to the pictures and using "mental elaborations" such as forming sentences with the given labels. Only three of the kindergarteners (from Studies I and II) reported attempts at labelling and even then not for all the pictures used.

It is not possible to determine whether the results obtained in the present investigation are due to the representational abilities of *Ss*, or the differences in the stimulus properties present in the different modes, or due to some other yet unidentified factor. As Rohwer (1970b) indicates:

The major issues still in need of attention include the theoretical problem of finding a unifying account of the effects of visual and verbal elaboration as well as that of clarifying the matter of visual and verbal dominance relations when viewed developmentally (p. 245).

The motor mode is not chosen for comparative purposes here because it was observed that being confounded with visual exposure to stimulus, it ceased to be a motor stimulus for coding purposes. With this additivity of cues, the performance on the motor task at all grade levels, exceeded that of the visual, but was inferior to the verbal task.

CONCLUDING COMMENTS

The findings of the present study, most specifically the absence of a Mode \times Age interaction raises doubts regarding the applicability of Bruner's thesis regarding developmental changes in the preferred mode of representation to the age-span studied here (5 to 12 years). With the ever-increasing bombardment of verbal stimuli through the media of television (for American children) and the increasing accessibility to the printed material in books, the shift to verbal encoding of stimuli is likely to occur earlier now than ever before. A study similar to the present one using Ss from 2 to 8 years of age may provide developmental information that could not be obtained in the present study.

The major issue here remains the failure of the present experiment to detect developmental differences in the relative efficiency of verbal, pictorial and kinesthetic modes of representation. At least three features of the present study make it impossible to give a definite answer to the question of whether or not any one of the modes has developmental priority.

- (a) The performance of the youngest population sampled here was only slightly above chance level and it is likely that this obscured the differences in the effects of the interpolated activities.
- (b) The second age-group in this study consisted of a sample of third-graders. It is quite possible that by this age compensatory processes may have already developed to the point where they obscure the primacy of any one mode.
- (c) The motor task was confounded by visual exposure to the stimuli, resulting in Ss remembering them as "What they

looked like". This lack of distinction between the motor and visual mode may again have obscured the developmental differences, if any, in modality preference.

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A Scientific Study of the Results of a Pre-University Course (P.U.C.) Examination at a Centre

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This statistical study of the results of a Pre-University Examination (one of the centres) was undertaken to provide as a basis for promotion a measure of the general ability of the respective candidates based on a combination of the results in all the subjects.

Since schools have existed, teachers and other school officials have attempted to measure the abilities of students in each of the subjects by examinations. Teachers' mark is a measure of the inherited capacity, ability to do and specific performance. The measure of the abilities of students obtained in these ways are regarded as possessing a high degree of precision and are considered very important. An arbitrary minimum is fixed and a student is considered to have passed if the mark obtained by him is equal to or greater than this minimum, say the 'passing mark', and a student is classified as a failure if his mark is below this 'passing mark'. Since the early years of this century a number of investigations were carried out by eminent educationists to ascertain the accuracy or validity of these measures obtained by means of teachers' estimates and marks in examinations. These gave rise to analytical studies of the material gathered and statistical methods were freely made use of to interpret the results. In the earlier stages the educational

statisticians concentrated their attention on the 'distribution of ability'.

In 1904, Spearman,¹ for the first time, discovered the 'heirachical order' among correlation coefficients of the abilities of different subjects and propounded the 'theory of general ability and the theory of two factors' which has been built upon this foundation. These ideas dominated correlation work in its application to psychology for a good number of years. In India, the Calcutta University Commission of 1917 recognised the importance of a Statistical Bureau in the university and recommended for the establishment of one in the following words:

A Special Examinations Board should be set up in the University. In Order to deal with the problems of examination on a large scale, it will need the services of a skilled statistician acquainted with the modern methods of statistics, who should be a member of the Board. For, such a Board should also suggest new departures and improvements in dealing with various problems involved in the setting of question papers, of co-ordinating the marking of a set of assistant examiners and of estimating the unavoidable elements of chance in the assignments of marks, etc.²

Subsequently, some studies were undertaken by Indian Institute of Technology, Kharagpur (1965), Madras University (1962), Baroda University (1963), Gauhati University (1965), and University Grants Commission (1964), to mention a few, on important aspects of pedagogic interest. They related not only to distribution of marks, the correlations, etc., but to the various causes of variations in valuation by different sets of examiners.

The object of this paper is to make a pilot analytical study of the results of a Pre-University Examination at a centre, making use of the statistical methods. For this purpose a centre is selected at random from the centres available. In an university examination, students should obtain 40 per cent and above in each language subject and 35 per cent and above in other subjects to be declared successful. Incidentally, it may be noted that the minimum of 40 per cent for languages and 35 per cent for other subjects is fixed

¹G. Spearman, "General Intelligence Objectively Determined and Measured", *Amer. J. Psy.*, 1904, XV, 201-92.

²*Report of Calcutta University Commission*, Vol. V, Chap. XL.

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arbitrarily and in no way connected with the setting of the question papers and standards of valuation. Candidates who fail to get the minimum in one or more subjects are sometimes awarded grace marks on an *ad hoc* basis. These are not generally assigned on any scientific basis, but depend on the general impression of the chief examiners. The object of the investigation is to give a scientific basis for giving promotion by a measure of general ability of the respective candidates, based on the combination of results in all subjects.

The marks obtained by 140 students who had taken Mathematics and Physical Sciences in Pre-University Course in 1970 at a particular centre were taken for analysis. The Arithmetic Mean (A.M.) Standard Deviation (S.D.) and Coefficient of Variation (C.V.) for the different subjects are given below:

	<i>English</i>	<i>Telugu</i>	<i>Mathematics</i>	<i>Physical Sciences</i>
Arithmetic Mean	30.75	44.19	31.13	34.59
Standard Deviation	9.49	6.42	24.65	16.70
Coefficient of Variation (C.V.)	26.85	14.52	70.18	48.45

The mean in the subjects is less than the mean in English and Telugu. However, it may be noted that the minimum for languages is 40 per cent and for other subjects it is 35 per cent. Also the means in English and Mathematics are far below the pass marks, while the mean in Telugu is greater and the mean in Physical Sciences is slightly less than the pass mark. S.D. and C.V. are highest in Mathematics, lowest in Telugu. This shows that there is tendency of concentration of the students about the mean in Telugu and English and a more even dispersal along the whole range in the subjects from S.D. and as well as from C.V. The variability in the four subjects can be arranged in the ascending order as Telugu, English, Physical Sciences and Mathematics.

It is of great interest to see whether there is any correlation *inter alia* between the various subjects, i.e., whether efficiency of a student in any subject indicates efficiency or the opposite in some other subject. To calculate the correlations, Karl Pearson's Product Moment-Formula is used:

Correlation Coefficients between :

1. English and Telugu	..	(r_{12})	..	0.4821
2. English and Mathematics	..	(r_{13})	..	0.1009
3. English and Physical Sciences	..	(r_{14})	..	0.6881
4. Telugu and Mathematics	..	(r_{23})	..	0.3367
5. Telugu and Physical Sciences	..	(r_{24})	..	0.2921
6. Mathematics and Physical Sciences	..	(r_{34})	..	0.6104

The correlation between English and Mathematics is least and the correlation between English and Physical Sciences is highest. The correlation between Mathematics and Physical Sciences is also high. The correlation between English and Physical Sciences may be taken to give a quantitative measure of the extent to which the power of expression in good English is necessary in various science subjects. Clear thinking and precise expression which are so very essential in science subjects explains for the high correlation between English and Physical Sciences. But it is a common experience for those in charge of the students that the average standard of mathematics students in English is far less than that of any others. But it is seen that actually the correlation between Mathematics and Physical Sciences is slightly less than the Correlation between English and Physical Sciences. This is because of questions requiring the knowledge and use of Mathematics in Physical Sciences. Therefore, a student efficient in Mathematics can easily score good marks in Physical Sciences and so the correlation between Mathematics and Physical Sciences is only slightly less than the correlation between English and Physical Sciences.

For measuring the general ability of a candidate, a linear aggregate of marks in all subjects, based on the method of principle component in multivariate analysis, can be used. This is based on the assumption that the marks obtained in a subject can be split up into two major parts, namely due to the inherent intelligence of the candidate which may be termed 'general ability' superimposed by his special aptitude and other factors. Thus, the marks in the different subjects are expected to be correlated; the degree depending upon the affinity between the different subjects and general ability.

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Let the correlation matrix of these marks in the different subjects be :

	1	2	3	4
1.	r_{11}	r_{12}	r_{13}	r_{14}
2.	r_{21}	r_{22}	r_{23}	r_{24}
3.	r_{31}	r_{32}	r_{33}	r_{34}
4.	r_{41}	r_{42}	r_{43}	r_{44}

Where r_{ij} denotes the correlation coefficients between the i^{th} and j^{th} variable in this order : English (1), Telugu (2), Mathematics (3), and Physical Sciences (4), we may note that $r_{ii} = 1$ for all i .

These four variables can be analysed into various components or factors.

The system of linear equations are:

$$\begin{array}{rclclcl}
 r_{11}K_{11} & + & r_{12}K_{21} & + & r_{13}K_{31} & + & r_{14}K_{41} & = & \lambda K_{11} \\
 r_{21}K_{11} & + & r_{22}K_{21} & + & r_{23}K_{31} & + & r_{24}K_{41} & = & \lambda K_{21} \\
 r_{31}K_{11} & + & r_{32}K_{21} & + & r_{33}K_{31} & + & r_{34}K_{41} & = & \lambda K_{31} \\
 r_{41}K_{11} & + & r_{42}K_{21} & + & r_{43}K_{31} & + & r_{44}K_{41} & = & \lambda K_{41}
 \end{array}$$

Where k_{11} , k_{21} , k_{31} and k_{41} are the coefficients of the first principal component and λ , the chosen largest root of the determinant.

$$\begin{array}{cccc}
 r_{11}-\lambda & r_{12} & r_{13} & r_{14} \\
 r_{21} & r_{22}-\lambda & r_{23} & r_{24} \\
 r_{31} & r_{32} & r_{33}-\lambda & r_{34} \\
 r_{41} & r_{42} & r_{43} & r_{44}-\lambda
 \end{array}$$

The above system of linear homogeneous equations can have non-trivial solutions only if its determinant becomes zero.

Therefore, the determinant:

$$\left. \begin{array}{cccc}
 r_{11}-\lambda & r_{12} & r_{13} & r_{14} \\
 r_{21} & r_{22}-\lambda & r_{23} & r_{24} \\
 r_{31} & r_{32} & r_{33}-\lambda & r_{34} \\
 r_{41} & r_{42} & r_{43} & r_{44}-\lambda
 \end{array} \right\} = 0 \text{---(1)}$$

By substituting the values of r_{ij} in the determinant and solving (1), we have $\lambda_1 = 2.2803$. This is the largest root of the equation. The contributions of the first principal component to the variance are the squares of $k_{11} = 0.3803$, $k_{21} = 0.7747$, $k_{31} = 0.7440$ and $k_{41} = 1.00$, which are got by solving the system of equations and it is

$$\sum_{i=1}^k k_{i1}^2 = 2.3445.$$

The linear equation of the principal component is given by $k_{11}E + k_{21}T + k_{31}M + k_{41}(P.S.) = G$, where 'G' is the grand total and k_{11} , k_{21} , k_{31} and k_{41} are the loading factors.

If we substitute the prescribed percentage of marks in each subject in this equation, the value of 'G' necessary for success can be found. In this case, 'G' is found to be 126; and this should be the minimum total mark for success in the examination. However, some weight may be given for performance in individual subjects and so a minimum mark to be obtained in each subject can be fixed by multiplying the original minimum by the loading factor for that subject in the linear equation. So, some students who obtain the minimum value in general ability will not be considered for promotion, if they cannot obtain the specific minimum in individual subjects. Applying the loading factor (coefficients) in the above linear equation with the prescribed minimum for each subject, we find that the modified minimum for each subject is as follows:

<i>English</i>	<i>Telugu</i>	<i>Mathematics</i>	<i>Physical Sciences</i>
35.2	30.2	26.0	35.0]

Checking up the marks of the individual candidates, we find that 50 candidates out of 140 get above the 'G' mark. Of these, however, only 34 got the prescribed minimum in the different subjects. So, the other 16 candidates also can be considered for promotion on the basis of general ability.

However, out of these 16 candidates, eight got above the required minimum in each subject. So, in view of their general ability being above the minimum and also fixing the special minimum, not arbitrarily at 40 per cent and 35 per cent, but from the internal evidence of performance by all candidates, these eight candidates also may be promoted. The other eight, though they have minimum general ability, do not possess sufficient special ability in some of the subjects and so they may not be given the benefit.

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A Diagnosis of Some Defects in Spoken English Pertaining to Pronunciation, Stress, Pause and Intonation among Class VII Pupils

Arun Kumar Gupta

This paper reports an action-research project consisting of two parts: (i) diagnosis of defects in the spoken English of 48 Class VII pupils of a co-educational school; (ii) a remedial programme to correct these defects. One of the significant findings is that verbal fluency in English is not independent of achievement in written English.

Training in spoken English has been probably the least emphasized aspect of English language teaching in India since independence. It is partly due to the emergence of pseudo-national anti-English attitude just after the exit of the British, but more so due to faulty, nay, naive fixing of priorities in English language teaching, that speaking good English has never been recognised as an objective worth achieving at all at various stages of education. It is not surprising, therefore, that most of our teachers in schools teach English as a 'secondary' language no better than they teach a dead language like Sanskrit. Also, most of them feel pride and heavenly satisfaction if their pupils can adequately recognize a word in English by its spelling rather than by its sound and while com-

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municating, speak English just like they speak Hindi, Punjabi, Tamil, Bengali, or Marathi—in the manner of their illustrious teachers!

Research in the field of foreign language teaching has shown that to be successful, the teaching of a language must start in its spoken form. "Children", says Dechant, generally must learn the alphabet of sound before they can be taught the alphabet of letters¹. The sequence of skills in order of priority then would be—

- (a) understanding the language or comprehension;
- (b) ability to speak the language;
- (c) learning to read it; and
- (d) learning to write it or communication.

At least the two most effective and popular methods of teaching English, namely, the Direct Method and the Structural Approach recognize this sequence in which good pronunciation is the key to success at all stages of learning. Needless to say that if pupils have no grounding as to how a language is spoken in correct manner, they would not only suffer from low intelligibility and thus poor comprehension but their written expression and reading ability—in short, their achievement level in English is likely to be impaired. It would, therefore, appear that if any sincere attempts to improve our standard of English are made, emphasis on improving the oral aspects of the language must get priority over written aspects, especially at the school stage, for, in the words of Hornby.

It is important to start good habits right from the very first lesson, for 5 minutes drill in the early stages is worth 50 minutes at a later stage when bad habits have already been allowed to form.²

INTRODUCTION TO THE PRESENT EXPERIMENT

The present report concerns an action-research project which was carried out on Class VII pupils in Model Academy, Jammu. The school is a prominent co-educational higher secondary institution in Jammu since 1936 and is run on public-school lines. English is

¹E.V. Dechant *Improving the Teaching of Reading*, Prentice Hall of India Pvt. Ltd., 1969.

²A.S. Hornby. *Oxford Progress English for Adult Learners*. Oxford University Press, 1953.

introduced from the first grade level in the school which also enjoys good reputation for excellent board results in the State.

During December 1970/January 1971, a new class teacher, teaching English to the Class VI, reported about very poor performance of her pupils in English. The class visits by the Principal and the annual results falling a month later confirmed her observations. It was also observed that the spoken English of the pupils was very poor and that they were unable to pronounce correctly, even ordinary words—something which was no less than a shock to school authorities. Consequently, an action-research plan was designed and, to start with, improvement in spoken aspect of the language was aimed at. The whole project was divided into two parts:

- (a) Diagnosis of a few defects in spoken English, related to stress and pause and pronunciation; and
- (b) A programme to improve spoken English in the light of (a).

By the time the project started, the Class VI pupils had crossed over to Class VII. Nevertheless, they were selected for the programme.

EXPERIMENTAL DESIGN

Sample

The sample consisted of all the 80 boys and girls of Class VII studying in Model Academy, Jammu. The Mean age of the sample was 13 years. Due to certain controls, given below, that were applied, the final sample was reduced to 48 boys and girls (boys—35, girls—13):

Controls applied. The following variables were controlled.

(a) Physical handicaps

All the pupils were referred to an ENT specialist and pupils with defects in speech organs or other physical defects which might have repercussion on spoken language were eliminated from the sample.

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(b) *Mother tongue*

Only those pupils were selected who had Punjabi/Dogri as their mother tongue and who conversed in both these languages in their homes or in school.

(c) *Previous knowledge*

The previous knowledge of the sample was same in that all the pupils had studied their English texts to the same chapter.

(d) *Teacher*

The teacher who took up the action according to the experimental design had a good educational background, was trained and had her own education throughout in residential convent schools. As such she was considered most competent to handle the sample.

(e) *Motivation*

The motivational differences likely to come up among the sample due to new programmes, aids of teaching and new methods of evaluation were minimized by conducting the experiment in the most natural atmosphere without attaching any importance either to the methods of teaching or methods of evaluation. The teacher concerned was also briefed to this effect.

(f) *Action*

The action or the remedial programme was the same for all pupils in the sample with respect to the nature of the content, meaningfulness, method of presentation and method of evaluation.

Data Collected

Collection of the data regarding the following was necessitated by the study:

(a) Identifying data of pupils; their age, sex, mother tongue etc.

(b) Defects in spoken English.

In order to diagnose the main defects in spoken English pertaining to pronunciation and stress and pause, a special diagnostic test to be read aloud was prepared for the sample after consulting a good number of books on the subject and which enabled the investigators to select relevant words and sentences from students' text which could help in diagnosing defects in the following areas:

(1) Stress and pause.

(2) Diphthongs pronunciation.

(3) Vowel sounds.

(4) Consonant sounds.

(a) fricatives.

(b) plosives.

(c) consonant blends.

The test was in three sections. Section A consisted of 50 words carefully selected for studying pronunciation of individual words. The second section consisted of a short poem of four lines selected from Class VII text¹ which, in the opinion of the linguistics expert, could best diagnose some pronunciation and stress and pause defects. The third and the last section contained one paragraph once again selected from the text to diagnose the defects in stress and pause together with those in pronunciation. Great care was taken to ensure that the sample had been previously exposed to all words in the text in their daily classroom teaching before the programme. To test the spoken English each subjects, he/she was directed to read three sections of the test aloud in the most natural and correct manner he/she knew pausing in between and laying stress wherever he/she so desired. The test was administered individually and the pupils' performance was recorded on a tape-recorder. Later, these voices were played back and the responses were scored as being right or wrong by a committee of three teachers who had been trained previously to evaluate such sample recordings and who had shown good inter scores reliability among them-

¹A.F. Scott. *New Horizon Book IV*. MacMillan & Co., Ltd., London, 1968.

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selves.⁴ The total error scores of each individual were thus recorded (Pre-test).

While evaluating pupils' spoken English, defects in intonation and strong or weak forms were not taken into consideration.

Achievement in Written English

The percentage of marks obtained in English by all pupils in their first terminal test (just before diagnosis) were recorded to give their initial written achievement level in English. Later, their achievements in English in terms of percentage in the annual examination (after the action was completed), were also recorded.

Effect of the Programme or Action

After the completion of action or remedial programme which ran for a period of six months, pupils were once again asked to record their performance individually on the same diagnostic test before the tape recorder. Their responses were once again evaluated in the manner given above by the same committee. The error scores were once again recorded (Post-test).

ACTION HYPOTHESES

The following hypotheses were formulated for the action:

- (a) Language learning being a skill, requires a regular ear training and constant drill. Hence it is possible to improve the standard of spoken English of the pupils by exposing them to programmes making judicious use of audio-visual aids, oral and conversational drills based on phonetics and oral examinations in a class. (H₁)
- (b) Achievement in written English is not independent of the verbal fluency in English and there may be good correspondence between the two variables. (H₂)
- (c) Any attempt to improve the standard of spoken English of

⁴Inter Score Reliability Values (Scott's coefficient) $r_{12}=.92$ $r_{13}=.97$ $r_{23}=.93$

pupils is likely to improve their standard of written English as well. (H.)

DESCRIPTION OF THE ACTION OR PROGRAMME

Before any action was taken in hand, through observation and discussions among staff members, a comprehensive list of probable causes leading to defective spoken English was prepared as under:

- (a) Plausible causes which lie outside the influence of school—
 - 1. Home atmosphere.
 - 2. Regional inhibitions.
 - 3. Physical defects.
- (b) Those which may lie under school's influence—
 - 1. The teacher having insufficient command over spoken English.
 - 2. Inadequate classroom drill in English speech and other oral techniques.
 - 3. Lack of confidence among the pupils or their sluggishness to express themselves.
 - 4. Little or no use of audio-visual aids.
 - 5. Scholastic deficiency of pupils.
 - 6. Neglect of oral examinations.
 - 7. Lack of English conversation between teacher and the taught and among the pupils both in and outside the four walls of the classroom.

After analyzing the recorded performances on the diagnostic test, a list of some common defects in spoken English pertaining to defects in pronunciation and stress and pause, as observed by the committee of experts was prepared. It served as a guideline on the basis of which all remedial work was planned.

Special emphasis was laid on the spoken aspect of English language besides the usual classroom teaching for a period of six months. One period of 30 minutes' duration was added in class's regular time-table. Thrice a week oral drill and conversation were taken up. Words often mispronounced were gradually corrected. Side by side regular teaching work was carried out which increased pupils' vocabulary also. To acquaint pupils with the ideal English pronunciation, and stress and pause in conversational languages, use

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of linguaphone records prepared by B.B.C., London, for school children was made twice a week. The new words were explained contextually and the pupils were encouraged to converse with the teacher and other students in English language during the language periods. To ensure the strict adherence to this rule, a fine of one paisa per defaulter was imposed and the monitor in charge collected the fund. This was later spent on the entertainment of the sample.

Lastly, during winter months when the school time permitted it, the pupils were made to listen to the slow speed English news bulletin broadcast by the A.I.R. and the students were asked to repeat the text of the news during the time between gaps in news reading.

After the completion of the programme which coincided with the annual examination, the post-test was administered and the results were analyzed and evaluated.

TREATMENT OF DATA

The data collected before and after the programme were analyzed statistically. The error scores of the pupils on diagnostic pre-test were reduced to a frequency distribution and Mean and S.D. was worked out. The same statistics were worked out for the error scores of the pupils on the same test after the completion of the programme.

In order to evaluate whether the pupils had made significant improvement in spoken English or not, significance of difference between two correlated means, suitable for single group experiments, was worked out. In order to test whether verbal fluency in English, i.e., skill in spoken language was independent of the achievement in written English or not, *chi-Square* test of Independence was computed. The correlation between the two variables was inferred by finding Contingency Coefficient C. For this, pupils were divided into three categories, i.e., having good, average and poor verbal fluency which was inferred from their error scores in initial diagnostic test. [$M \pm 1.96 \text{ SEM}$] provided with three categories.] Similarly, scores in written examination at that time converted into percentages, on similar treatment yielded pupils who were high, average and low achievers.

Lastly, to test whether the pupils' level of achievement in English during annual examination had improved or not after the programme in spoken English, correlation between the two achievement distributions, one just before the programme and the other just after the programme was worked out. This was followed by the computing of the significance of difference between two correlated means applicable to single group experiments.

The conclusions were drawn in the light of statistical analysis of the data.

RESULTS

TABLE 1

*Major Defects in Spoken English Observed in the Group before and after the Programme (in order of their magnitude *)*

<i>Major Defects in Spoken English</i>	<i>Rankings (Order of magnitude)</i>	
	<i>Before the Pro-gramme or action</i>	<i>After the Pro-gramme or action</i>
1. Faulty Stress and Pause	1	4
2. Diphthong mispronounced	2	1
3. Defects in consonant sounds—	3	3
a. fricatives		
b. plosives		
c. consonant blends		
4. Faulty vowel sounds	4	2

*Intonation—weak and strong forms not considered.

TABLE 2

Significance of Difference between Mean Error Scores of the Group on Pre-test and Post-test (Spoken English)
(single group method for correlated means)

<i>Test</i>	<i>Number</i>	<i>Mean</i>	<i>S.D.</i>	<i>Correlation</i>	<i>t</i>	<i>Remarks</i>
Pre-test	48	41.10	12.38	.893	18.44	Significant beyond .01 level
Post-test		29.48	11.87			

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TABLE 3

*The Computation of Chi-Square Test of Independence between Verbal
Fluency in English and Written English Achievement Level*

A C H I E V E M E N T		Good	VERBAL Average	FLUENCY Poor	
	High	11 (7.1)	6 (3.7)	1 (7.1)	18
	Average	2 (3.2)	2 (1.7)	4 (3.2)	8
	Low	6 (8.7)	2 (4.0)	14 (8.7)	22
		19	10	19	48
$\chi^2 = 14.40$ $P > .01$					
$df = 4$ $C = .48$ $P > .01$					

TABLE 4

*The Significance of Differences between Means of English Achievement
Scores Taken before and after the Programme
(Single group method for correlated means)*

Test Achievement	Number N	Means M	S.D. O	Coeff. of cor- relation (r)	t =	Remarks
Before the Programme	48	33.87	15.17	.745	5.12	Significant beyond .01
After the Programme		41.40	14.06			

DISCUSSION

Table 1 shows the major defects in spoken English among the Class VII pupils as inferred from their performances on the diagnostic test before and after the programme. It was found that the major cause of poor spoken English among pupils at large was their faulty stress and pause. Section 2 and Section 3 of the diagnostic test were very helpful in throwing light on

this aspect. The stress and pause were found to be very irregular. Secondly, pupils were totally oblivious of stress patterns involved in a particular sentence. In the opinion of linguistic expert attached to the project this area which is of fundamental importance, needed utmost remedial emphasis. An analysis of pupils' responses on Section 1 enabled the investigators to know deficiencies in spoken English in terms of phonetical errors. For example, a majority of pupils showed a marked tendency to pronounce diphthongs incorrectly. Words like annual, again, dictation, wound, noise, voice, unusual, mouth, chair, wine, your, year, to mention just only a few, were helpful in knowing how pupils pronounced various diphthongs sounds. It was also found that the group made considerable errors in speaking various consonant sounds and consonant clusters, whereas many pupils failed to make fricatives sounds correctly (F, V, S, Z, O, f). (Performance on words like voice, floor, useful, pleasure, mouth, leave, noise, decision, knife, youth, thirsty, lovely, etc., to name a few.)

Similarly, many students did not make plosive sounds correctly (as shown by their performances on words like beware, cricket, spoken, tired, peon, believe, etc.). Lastly, pupils were observed to make faulty vowel sounds (in words like consist, confirm, hero, hate, sure, verandah, velvet, business, clear, thirsty, etc.). Apart from the above, pupils were found to be poor in speaking correctly, various consonant blends in words like dwarf, twelve, knife, comfortable, screech, knocking, stopped, clear, drink, etc.

The committee of teachers once again analyzed the defects of pupils in the spoken English after the programme was over and listed them in their order of magnitude as given in Table 1. An overall improvement in all aspects of spoken English pertaining to stress and pause and pronunciation was noticed. The major defects pertaining to stress and pause, noticed among the students during the initial test, had more or less been found eliminated on the second occasion thereby showing that improvement in this field had been considerable. The most noticeable defect in pronunciation in the post-test pertained to faulty diphthong sounds followed by faulty vowel sounds. The pronunciation of the words like mouth, peon, sure, tour, unusual did not show marked improvement. Similarly, words like hero, thirsty, heart, all, etc., were pronounced wrongly.

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Defects in making fricative and plosive speech sounds still remained, though not as pronounced as they were at the start. This was attributed to regional inhibitions because pupils of the Jammu region have a tendency to pronounce letters (Y as by, U as ju, V as b, etc.). No significant defects in stress and pause were noticed on the second occasion. On the whole it was felt by teachers that pupils had made considerable progress in their standard of spoken English after the special programme.

In order to find out whether the group made statistically significant improvement in oral English after the programme or not, the significance of difference between the mean error scores of the group on pronunciation test before and after the programme was worked out by employing single group method for correlated means. Means, S.D. and product-moment correlation (r) were worked out. The results are entered in Table 2. The value of t -ratio is 18.44 which is highly significant beyond .01 level of significance. This confirmed the first hypothesis (H₁) and showed that it had been possible to improve spoken English of Class VII pupils by a special programme making judicious use of oral drill, audio-visual methods and conversational drill based on phonetics followed by oral tests. The pupils made significantly few errors after the programme on the pronunciation test.

The frequency distribution of error scores before and after the action show that as many as 34 pupils out of 48, or nearly 71% made 30 or more errors on the first occasion, 13 or nearly 26% made 30 or more errors on the second occasion indicating that they had made considerable improvement on their past performance. In other words, the action or programme was highly successful.

In order to test whether verbal fluency in English was independent of the written achievement in English or not, *Chi*-square Test of Independence was employed and the correspondence, if any, between the two variables was inferred from the value of Contingency Coefficient (C) computed from the value of *Chi*-square. The results of *Chi*-square (8×3 Contingency table) is 14.40 which with 4 df is highly significant at .01 level. This confirms the second hypothesis (H₂) that there exists a close correspondence between verbal fluency in English and achievement in written English and

that contrary to many views, the two variables are not independent of each other. The value of C is .48 which is symptomatic of a good degree of correspondence (the maximum possible value of C in a 3×3 table=.82) and is significant at .01 level of significance.

Lastly, to study whether improvement in the standard of spoken English had resulted in any improvement in the level of written English achievement or not, pupils' achievement scores in English in the examination just before the programme and just after it were taken and converted into percentages. Significance of difference between the mean achievement scores was then computed. Mean, S.D. of two distributions were worked out and single-group method for correlated means was employed, the results of which have been entered in Table 4. The value of t is 5.12 which is significant beyond .01 level of significance. This in turn confirms the third hypothesis (H_3). In other words, it may be concluded that improvement in the level of spoken English has resulted in improvement of the level of written English of pupils at Class VII level.

CONCLUSIONS

In the light of above discussion, the following conclusions have emerged from the present experiment.

- (1) It has been possible to diagnose defects in spoken aspects of English language pertaining to stress and pause and pronunciation at Class VII level with the help of a special diagnostic test constructed for the purpose based on pupils' vocabulary level. This test proved to be an effective tool in diagnosing pupils' weaknesses in the spoken English.
- (2) It has been found that it is possible to improve the level of spoken English of the Class VII pupils by exposing them to a stimulating programme, comprising oral and conversational drills, based on phonetics, audio-visual aids, and oral tests. Pupils who were given such a programme made significantly fewer errors on the diagnostic test after the programme and showed significant improvement in their level of spoken English.
- (3) Verbal fluency in English was found to be closely related to achievement in written English test. Students who are poor

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in the former are likely to be poor in the latter at the Class VII level.

(4) An improvement in the standard of spoken English of the Class VII pupils has been found to result in higher achievement scores in written English as well. Hence, one method to improve written English standard at the Class VII level may involve an attempt to improve the level of spoken English of pupils in the class.

RECOMMENDATIONS AND SUGGESTIONS

Recommendations

(1) Similar diagnostic tests should be prepared by competent teachers at various grade levels to test the levels of spoken English of pupils at that stage.

(2) The pupils of Class VII should be given a special programme for making correct diphthong sounds and for correcting their vowel sounds, fricative and plosive pronunciations.

(3) Oral tests should be introduced in the regular pupil-evaluation programmes and due weightage should be allotted to them in pupils' total marks in English language.

(4) It is advisable to devise special remedial exercises based on the individual errors rather than providing a general programme for the sample.

(5) A special period for the spoken English should be introduced at least thrice a week in the classes in which a well laid out programme consisting of oral drill, conversational drill, linguaphone records and tapes should be included. A teacher having a sound knowledge of phonetics, should be made incharge of such a programme.

(6) A follow-up study of Class VII students should be made after an year and their level of spoken English should be re-tested with a modified test of a greater range than the present one.

(7) All language teachers in the school should be given a programme for improving their standard of spoken English.

Suggestions for Further Work

(1) It would be worthwhile to standardize on a wider population, a new diagnostic test for finding out defects in the spoken English pertaining to stress and pause, pronunciation and intonation, weak and strong forms for school children in the region.

(2) It would be worthwhile to test the relative efficiency of various methods used in the present programme as to the extent to which they cause improvement in the spoken English. For example, relative merits of oral drill, conversational drill, linguaphone records, A.I.R.'s slow-speed bulletins, etc., to name just a few, may be statistically analyzed.

(3) It would be worthwhile to differentiate the effects of such programmes on spoken English in different contexts and different subjects.

(4) It would be worthwhile to analyse the defects and improvements in spoken English by adding another section of a conversational sentence in the diagnostic test. Later, data should be analyzed separately for performance in prose, poetry and conversation and individual work.

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Individual Differences and Conformity

Mirza S. Saiyadain

The author reviews research done in the area of individual differences and conformity between 1958 and 1973. The studies discussed together cover seven variables: birth-order, age, sex, intelligence, self-esteem, need achievement, and authoritarianism.

As a part of larger review of personality and group behaviour, Mann (1959) surveyed the research concerning personality and conformity which has been published prior to 1957. At the time, the number of studies reviewed was quite small, i.e., only ten. Moreover, the range of variables explored in connection with individual differences and conformity was also limited: adjustment, extroversion-introversion, dominance-submission, and conservatism. On the whole, Mann found that the findings were inconsistent, and in some cases contradictory.

Despite the rather meager findings which have been produced in connection with this line of research as of 1957, researchers have continued to explore individual differences in conformity behaviour. Indeed, the rate at which the reports have been published in this particular area has increased substantially during the past decade

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or so, and shows no sign of decreasing. The purpose of this paper is to review the research studies which have dealt with individual differences and conformity from 1958 to 1973. In this regard, the studies reviewed here cover seven individual differences domains as related to conformity: (1) birth order, (2) age, (3) sex, (4) intelligence, (5) self-esteem, (6) need-achievement, and (7) authoritarianism.

Since their introduction Sherif's (1935) autokinetic technique, Asch's (1951) line comparison method, and Crutchfield's (1955) variation of Asch situation have been the most popular methods for studying conformity in laboratory settings. Most of the studies reviewed in this paper are based upon one of these techniques or upon a variation of one of them. In these studies conformity has typically been operationalized as a change in one's position (attitudes, opinions, beliefs, and judgements) towards that represented by a group norm. In a few of these studies reviewed here, however, conformity was operationalized as change towards a credible or highly valued source of communication. It should be noted that excluded from this review are studies which involve only naturalistic observation as well as studies which deal with coercive change.

1. *Birth Order*

The popularity of the birth order variable in conformity research is due to a large extent to the efforts of Schachter (1959). In particular, he presented some interesting experimental evidence regarding differences in response to stress between the first or only born, and their siblings. He concluded that the first born was more anxious in stress situation, and with anxiety held constant, more dependent on other persons as a "source of approval, support, help, and reference." (1959, p. 82).

Since the publication of Schachter's results, the interest in the variable of birth order has accelerated. Research studies that have probed the relationship between birth order and conformity have showed both positive and negative relation. Comparatively more studies have found first borns to go more susceptible to influence than later borns. Thus, Dittes (1961) manipulated the degree of

peer acceptance and found later born *Ss* virtually unaffected. In an autokinetic situation involving induced stress (threat of electric shock), Staples and Walters (1961) found that the first born conformed more. Radloff (1961) found that the early born female *Ss* showed greater opinion change than did later born *Ss* following exposure to highly credible persuasive communication. Schachter (1964) did his experiment in the natural settings of sororities and fraternities and found first born choosing their associates more in conformity with the normative (most popular) choice than did later born. Additional evidence comes from Carrigan and Julian (1966) who found first born conforming more than later born in peer group pressure situations.

In contrast, there are four studies that have found first born less susceptible to social pressure when compared with later born. Sampson (1962) found that the first born females resist influence attempt more than later born in two-person situation, where a confederate played the role of an expert and sought to persuade the *Ss* to adopt a position which he advocated on issues about USSR and USA. However, this relationship was reversed under conditions of reward and punishment; i.e., first born conformed more than the later born under conditions in which they were rewarded for conforming behaviour. It is hard to draw any meaningful conclusions in this study because factors such as sex, age, sex of siblings, and age differential between siblings were not controlled. Moreover, the first born category consisted of first and only first, while the later born included second born or later.

In a study Arrowood and Amoroso (1965) gave each *S* feedback purporting to show the distribution of opinion in the group. Through this procedure half of the *Ss* were led to believe that they were "deviates." On the other hand, the rest were led to believe that they were "conformers." Consistent to their hypothesis, they found that the first born deviates changed their opinion towards the modal group opinion more readily than the later born deviates. The difference was statistically significant. On the other hand, first born conformers resisted change significantly more than later born conformers.

In another experiment, Becker, Lerner, and Carroll (1964) were able to reverse the relationship between birth order and conformity

by varying the amount of pay-off for performing accurately. When no rewards were given, the first born made more errors in Asch situation (conformed more) than later born. In contrast, when rewards were high later born made more errors than the first born. In a subsequent study, Becker, Lerner, and Carroll (1966) found essentially the same results.

Other studies have obtained findings which suggest that birth order *per se* may not be directly relevant to conformity. For example, Schmuck (1963) studied the effect of birth order and sex of the sibling on conformity behaviour. He found no relationship between birth order and compliance or defiance; he did find, however, that girls with sisters showed greater tendency to defy than girls with brothers.

In a provocative study, Miller and Zimbardo (1966) looked at a different aspect of birth order. They proposed that the last born children who are at least five years younger than the next older sibling react more or less like the first born. They explained it in terms of lack of enough age-appropriate peer model for social comparison as in case of first born and hence less certainty of response under unfamiliar situations. Helmreich and Kuiken (1968) subsequently tested this proposition in an attitude change experiment. In the pretest, *Ss* attitudes towards the military draft were assessed. They were then exposed to a persuasive communication favourable to universal military service. The "big-gap" last born showed as much resistance to attitude change as the first born.

The discrepancy in the findings surveyed here can be explained in a number of ways. First, as has been pointed out by Warren (1966), there are variations in the definition of birth order. Studies have compared samples of the oldest with the youngest and first born with later born. In some studies the only child has been treated as first born. In addition, other aspects of sibling and familial relationships are frequently ignored, e.g., little or no attention has been paid to the number of pregnancies of the mother, sex pattern of sibship, or even the age differential of siblings (the importance of the later variable is well illustrated by Helmreich and Kuiken study discussed above.) Ideally speaking, all positions of birth order, some index of age differential, and sex of the siblings should

be taken into account in research dealing with birth order (Waldrop, 1965).

Finally, it is becoming increasingly clear that birth order *per se* may be of limited usefulness as a predictor of conformity. Rather, there is evidence that birth order interacts with other dimensions of individual differences (e.g., anxiety and sex) and certain situational variables (e.g., level of reward, presence of age-appropriate models) in determining conformity.

2. Age

It is frequently assumed (Hollander, 1960) that age and conformity are inversely related—for a variety of reasons. In this regard it has been argued that decrease in susceptibility to influence attempt as a function of age results from wider learning experiences, greater self-confidence, independence, and increased autonomy (Hovland & Janis, 1959).

Several studies appear to support the inverse relationship assumption. Thus, in an extensive study, McConnel (1963) used *Ss* of 6 through 18 years, each group having an average I.Q. of 110. The task consisted of identifying which of the two figures projected was bigger under four conditions: (1) zero susceptibility, (2) ambiguous prestige suggestion, (3) non-ambiguous prestige suggestion, and (4) peer suggestion which he calls "conformity suggestion." Although the average conformity varied across the four conditions, all the curves when plotted for age showed the same trend, i.e., decreasing susceptibility with increasing age. Similar findings are reported by Patel and Gordon (1960) and Schonbach (1969). Finally, Tuddenham (1961) found that college students of both sexes tended to yield less than younger age (10-12 years old) of approximately the same socio-economic status. His findings, however, were not statistically significant.

On the other hand, there is evidence which suggests that there are upper and lower limits to the inverse relationship hypothesis. For example, in a study involving pre-school children Orcutt (1968) found no significant differences in the yielding behaviour of 3, 4, and 5 years olds; in all groups conformity was

generally infrequent. There was some indication however, that conforming behaviour may begin to emerge at about the fifth year.

A similar conclusion was reached earlier by Hunt and Synnertdahl (1959). Of 110 judgements made in a modified Asch situation by ten 5-6 year old children (both male and female), only 21 (12%) were in the direction of confederates judgements. The investigators concluded that for children of this age the situation involved very little "social pressure." That is, the socialization of these children has not progressed to the point of developing the kind of group orientation which are assumed to characterize the behaviour of slightly older children.

Other studies suggest that conformity increases with age up to a certain level, beyond which it decreases, thus yielding an inverted U-curve. Here Hovland and Janis (1959) found conformity to increase up to the age of 8 and 9 and then to decline. In a more recent study, Castanzo and Shaw (1966) using the Crutchfield simulated group situation found evidence to support the curvilinearity hypothesis. They found that mean conformity increased with age up to 11-15 years and then declined. Their results indicate that this trend was identical for both the sexes.

The curvilinear relationship between age and conformity, however, does not seem to be equally applicable to all kinds of samples, particularly for samples differing in sex and race. Iscoe, Williams, and Harvey (1963) found that male conformity increased with age to a greater extent than that of female. In their study male continued to conform in a group influence situation (Crutchfield technique) to the age of 15, while female began to decrease after age 12. As far as racial identification is concerned, they found conformity in white children to increase from 9-12 years and then to decrease somewhat at the age of 15. Negro children, on the other hand, showed a progressive decrease in conformity after age 9.

The simple relationship between age and conformity also seems to vary with the method of analysis used. Iscoe, Williams, and Harvey (1964) used two conformity criteria. One criterion was the frequency with which Ss agreed with the incorrect judgment made by a confederate concerning the number of metronome clicks. The second criterion consisted of an "adjusted" score which took into

account the errors made in the absence of the confederate's judgments. In their study it was found that age showed a decreasing relation with conformity when the first criterion was used. However, the relationship became curvilinear when the conformity criterion was based on the adjusted score.

In summary, the relationship between age and conformity remains somewhat unclear. There is evidence of both linear (positive and negative) as well as curvilinear relationship. Moreover, it seems that age *per se* is either unrelated to conformity or is related via the situational variables and/or other personality characteristics. And finally, there is also some indication that the nature of the relationship might be determined by the method of analysis used.

3. Sex

It is frequently proposed, (e.g., Hovland & Janis, 1959) that in Western society—including the US—culturally determined role expectations prescribe passivity and compliance as appropriate behaviour for the female sex role. Such expectations, it is further proposed, should lead to greater conformity by females than by males. The assumption is that these expectations are well learned and accepted by the members of the society in question.

Very few studies have focused only upon the sex of the *Ss* and conformity. Of these studies which have, many have supported the prediction that in American culture females are more susceptible to influence than males (Beloff, 1958; Abelson & Lesser, 1959; King, 1959; Tuddenham, 1959, 1961; Divesta & Cox, 1960; Patel & Gordon, 1960; Scheidel, 1963; Hollander, Julian, & Haaland, 1965; Carrigan & Julian, 1966). In another study Reitan and Shaw (1964) found that when males and females were put in the same-sex groups, females conformed more than males. It is also interesting to note that Whittaker (1965) demonstrated that though females changed more than males, males had more persuasive influence than females regardless of the sex of the *Ss*.

Despite the strong evidence suggesting greater conformity by females, several studies suggest that other characteristics of the individuals, as well as the situational factors, must be taken into

account. Specifically, Crowne and Liverant (1963) studied the effect of sanction on female conformity. They found that susceptibility to change increased among females when they were exposed to negative sanction for conforming. Such was not the case for males.

In a study mentioned earlier, Iscoe, Williams, and Harvey (1963) found that although females conformed more than males, on the whole, female conformity increased up to the age of 12 and then decreased with increasing age. For males, however, conformity increased up to 15 and then decreased. Also relevant to the age by sex interaction is a study by Orcutt (1968), who found that there was no significant difference in the performance of girls and boys of 3 and 4 years, but the 5 years old girls were significantly more conforming than the 5 years old boys. In another study, Iscoe, Williams, and Harvey (1964) found an interaction between sex and race. While Negro and White males were similar in conformity behaviour, Negro females conformed less than White females. Indeed, the mean conformity score of Negro females was less than White or Negro males.

In a very interesting study, Schmuck (1963) showed that females who have only female siblings showed greater tendency to defy (as measured by a short projective technique devised by Davis, 1954) than females with male siblings. Carrigan and Julian (1966) found sex differences interacting with birth order in determining individual's susceptibility to social influence. Using 6th graders, they found that first born males conformed more than later born males in a "potentially sociometric rejection" condition. Conformity by their female Ss was not influenced by birth order. In a study by Jenson and Knecht (1968) male versus female conformity was found to differ when the nature of appeal was manipulated. Females tended to change their attitude towards X-ray usage in both of the conditions they studied: exposure to peer group attitudes ("conformity appeal") and exposure to a film showing the harmful effects of X-ray ("emotional appeal"). Males, on the other hand, showed substantial change only in the "conformity" situation.

Not at all available evidence, however, reveals a sex difference in conformity behaviour. Phelps and Meyer (1966) used a modified Crutchfield technique in which Ss made judgments about line

lengths, and found no significant sex difference in conformity. In addition, after reviewing the literature on sex differences in susceptibility to hypnosis, Hilgard (1968) concluded that "while some subtle differences will no doubt be discovered in time, the general burden of evidence at present is that men and women are equally susceptible to influence." (p. 217).

Finally, one should keep in mind the "Biased-origin" explanation of sex differences (McGuire quoted in Marlow and Gergen, 1969). Virtually all the findings concerning female conformity have been obtained by male researchers. Would similar results be obtained if testing tools were developed, standardized, and used by female psychologists? At this time we do not know.

4. *Intelligence*

It is frequently assumed that intelligence and conformity are negatively correlated. The general assumption behind this is that the intelligent individuals achieve a greater clarification of the task. Accordingly, there is less ambiguity (a relevant variable in conformity; see Allen, 1965) in the tasks. In one of the early studies dealing with intelligence, Crutchfield (1955) found intelligence and conformity negatively correlated. It should be noted, incidentally, that the coefficient he obtained ($-.63$) was the highest ever found.

More recently, at least there are four studies that have found significant negative relationship between intelligence and conformity. In a study in which intelligence was measured by such indices as Cooperative Reading Test Vocabulary, AEC Psychological Examination (language), and academic achievement conformity was found in a variety of situations (attitudinal, informational, and perceptual) to show significant negative relationship (Divesta & Cox, 1960). Smith, Murphy, and Wheeler (1964) found a significant negative relationship between intelligence and conformity in two-person groups. The effect decreased when authoritarianism was partialled out but still remained negative. Long (1970) divided his sample of 109 prisoners on the basis of the social structure of the group (i.e., Negro and White *Ss* exposed to either Negro or White confederates). For a total sample of 109 *Ss*, he found a significant negative cor-

formity, except under condition of threat. Here the conformity score increased with decreasing self-esteem.

It has been postulated that the relationship between self-esteem and conformity depends on the comprehensibility and the persuasibility of the influence attempt. Nisbett and Gordon (1967) report no relationship between self-esteem and conformity under conditions of easy comprehension. In the "difficult to comprehend" situation the relationship was slightly (but not significantly) positive.

When the variable of sex was manipulated, Silverman, Ford, and Morganti (1966) found a curvilinear (U-shape) relationship between self-esteem and conformity for females; for male Ss, however, the relationship was negative (though not significantly so). Curvilinearity by females is also reported by Cox and Bauer (1964) and Gergen and Bauer (1967).

In another study, Greenbaum (1966) assessed Ss' perception of choice by asking them to what extent they felt they had a choice in selecting the topic of their role play, a technique used to elicit conforming behaviour. He found that when "no choice" was perceived high self-esteem Ss changed more than low self-esteem.

Finally, there is evidence that relationship between self-esteem and conformity may vary according to the degree of the acceptance of the influence attempt. Using Kelman's (1961) conceptual framework, Klein (1961) found that Ss who showed high public change only ("compliance") were higher in self-esteem than were Ss who showed high public and private change ("conformers").

Thus, on the face of it, it might seem that the relationship between self-esteem and conformity is inconsistent, a deeper analysis of literature points out that it is not a simple matter of conformity vis-a-vis self-esteem. Rather self-esteem interacts with comprehensibility, nature of appeal, need-affiliation, experimental conditions, and level of influence acceptance in generating conformity or non-conformity to social influence.

6. *Need-achievement*

McClelland *et al.* (1953) analyse some of the data from Asch's (1951) study and found that only 13% of the Ss *above* the group median on need-achievement conformed, while 87% *below* the median

conformed. This indicated a strong tendency on the part of the high achievers to resist social influence. Such a finding was seen consistent with theoretical framework developed around need-achievement concept. As recently expressed, the person high on need-achievement should be more concerned with being right than with "fitting in" (Marlow & Gergen, 1969).

Despite the additional evidence which supports the earlier findings (see Divesta & Cox, 1960), most of the recent studies have indicated that the relationship between need-achievement and conformity depends upon the nature of the situation in which the conformity is assessed. Thus, Zajonc and Wahi (1961) using a sample of foreign students, found that when conformity was perceived instrumental to achievement a positive relationship between need-achievement and conformity was obtained. Similar findings are reported by Sampson (1962) who showed that high need achievers resisted influence attempt except when conformity lead to achievement. McDavie and Sistrunk (1964) demonstrated that one may find a negative relationship between need-achievement and conformity, but only when the task is soluable. In insoluable task they found no relationship between the two for both male and female *Ss* (in their experiment, soluable task consisted of discrimination judgements of auditory and visual nature with 95% accuracy by pretest *Ss* from the same population, and insoluable was judgements of indiscriminable pairs).

In addition, there is also some evidence that need-achievement and conformity relationship is partially influenced by late versus early independence training. In a study by Krebs (1958) he found that *Ss* who were low on need-achievement and also had late start of independence training conformed more than *Ss* who were low on need-achievement, but had early independence training in life.

Finally, there is one study by Endler (1961) that shows no relationship between need-achievement and conformity, but instead demonstrated that conformity was dependent upon the situational variables, i.e., private versus public announcement of judgements.

This survey suggests that the negative relationship between need-achievement and conformity (found earlier) may be modified by the nature of the situation. Indeed, there is reason to believe

that the relationship between need-achievement and conformity is positive when the situation is such that conformity leads to achievement.

7. *Authoritarianism*

Literature on authoritarian conformity is not very consistent. Several investigators have hypothesized that authoritarianism implies a relatively high degree of susceptibility to influence attempts. Since the authoritarian scale include measures of "conventionalism" and "authoritarian submission", one might assume that the authoritarian should tend to be conformist in the sense that he would be expected to conform rigidly to the suggestions of his peers and authority figures. Studies by Crutchfield (1955), Canning and Baker (1959), and Nadler (1959) found tendencies towards greater conformity among their more authoritarian *Ss*, using the California *F*-scale as a measure of authoritarianism.

In Crutchfield's study, *Ss* were led to believe that four other *Ss* also were participating in the study. The judgments of line comparisons (as well as socio-political attitudes), supposedly produced by four other *Ss*, were in actuality simulated by the investigator. The Canning and Baker study used more direct personal influence. Confederates exposed *Ss* to group pressure in a face-to-face situation by announcing greater distance than expected in an autokinetic situation. Nadler also announced bogus judgments to his *Ss* whose apparent task was to match one of the three lines of variable lengths with standard line. All three studies involved judgment about material visually presented (Crutchfield's study also involved attitude items) to the *Ss* and all three found greater conformity by high authoritarian *Ss* than by low authoritarian *Ss*.

Among other studies that have found greater conformity among more authoritarian *Ss*, Wells, Weinert, and Rubel (1956) created a situation in which college students made judgments about a traffic accident with stooges pressuring half of the *Ss* to blame the "wrong driver". Those who were swayed under pressure had higher *F*-score than those who did not. Similarly, Lasky (1962) reported that a group of student nurses with high *F*-score changed their responses

on F-scale itself upon retest more than low scorers, when told that their peers scored in the opposite direction. Similar results are reported by Beloff (1958), Small and Campbell (1960), Weiner and McGinnies (1961), Wright and Harvey (1965), Larsen (1969), and Vaughan (1969). Even when the effect of intelligence is partialled out (Smith, Murphy, & Wheeler, 1964), and when sex differences are controlled (Vaughan & White, 1966) this positive relationship has been supported.

Some investigators have suggested that authoritarianism, when measured by F-scale, might be confounded by general acquiescence. Starting with the assumption that the relationship between conformity and F-score might be contaminated by acquiescence, Vaughan and White (1966) assessed authoritarianism in a forced choice version of F-scale (see Berkowitz & Wolkan, 1964) designed to control for acquiescence. They found that conformity was associated with higher scores on F-scale and concluded that acquiescence alone could not have accounted for these results.

Several other studies have failed to find a positive relationship between conformity and authoritarianism (Weiner & McGinnies, 1961; Steiner & Vannoy, 1966). Since these studies have used a variety of experimental situations a direct comparison among these studies is not possible. Steiner and Vannoy (1966) point out that there may be a variety of conforming behaviours with different psychological meanings and suggested that one explanation for these contradictory findings may be the situational and other personality variables. In this regard, status, nature of group pressure, and racial composition have emerged as most relevant variables.

There are at least four studies that have investigated the effect of status upon authoritarian conformity. The findings have been contradictory. Vidulich and Kaiman (1961) found neither authoritarianism nor status related to conformity in simple manner. The major source of variation was the interaction of these two. High authoritarians exposed to high status pressure changed more than high authoritarians exposed to a low status source. In contrast, low authoritarians tended to agree with a low status rather than a high status source. Larsen (1969) reports that when the source status is reported low, both high and low authoritarians changed more than a condition involving a high status source.

On the other hand, if credibility can be equated to high status, Johnson, Torcivia, and Poprick (1968) found a significant interaction between F-score and source credibility with respect to attitude change. Low authoritarians changed more in the high status source condition and less in low status source condition as compared to high authoritarians.

Finally, there is one study by Gorfain (1961) who found that suggestions coming from a high status source, (e.g., the peer group or the experimenter) did not make any difference in the conformity response of both low and high authoritarians.

As far as nature of group pressure is concerned, in an early study Steiner and Johnson (1968) found that when others are not unanimous, the authoritarians may be more conformist than non-authoritarians. Deutsch and Gerard (1955) argued that in most experiments on social influence, (e.g., Sherif, 1935; Asch, 1951) the *Ss*, as they made their judgment, were *not* functioning as *members* of the group in any simple or obvious manner. All they did was make judgments in the physical presence of the others with practically no instructions to make them a part of the group faced with the task requiring cooperative efforts. According to Deutsch and Gerard, under such conditions it is most likely that conformity (or behaviour change) resulted from *informational social influence*. Specifically, they define informational social influence as influence which results from accepting information from another about the nature of reality. On the other hand, if *Ss* are a part of a group, if conformity occurs it is most likely to result from *normative social influence*. Specifically, influence which results from conformity with the positive expectations of others.

Among other studies that are relevant to the normative versus informational social influence distinction, some have reported that under conditions involving no explicit social norm, but simply new information about the task, persons scoring high on F-scale show strong resistance to change (Mischel & Shopler, 1959; Harvey, 1968). On the other hand, studies which have found authoritarians to be more easily influenced than non-authoritarians have been those involving direct attempts by others, particularly when others are seen as constituting an "in-group" (Steiner & Johnson, 1968).

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Since these studies have dealt with different kinds of tasks, a direct comparison is difficult. Nevertheless, the findings suggest that authoritarians are not easily influenced by information *alone* but by information presented by members of a group to which they belong. Thus if group membership is seen fostering normative influence, it could be hypothesized that authoritarian conformity will be greater when change is advocated in normative context as against an informational context. There is some preliminary evidence to support this view (Saiyadain & Summers, 1973). Using the Deutsch and Gerard (1955) formulation, they found that the amount of change advocated and the nature of influence attempts were important in accounting for authoritarian conformity. Specifically, when the amount of change advocated was small, no difference between high and low F *Ss* was observed. When the discrepancy was large, high and low F *Ss* differed only in informational influence condition, i.e., low F *Ss* tended to change more. Or stated somewhat differently, authoritarian *Ss* changed *only* when exposed to normative influence. Non-authoritarian *Ss* conformed in both normative and informational influence conditions.

There is at least one study that has manipulated the racial composition of the group. Katz and Benjamin (1960) studied authoritarian conformity in bi-racial groups. The test consisted of reaching unanimous agreements about suitable answers to a set of questions concerning two human relation problems. Before each discussion, *Ss* answered the same questions privately. Using the sum of difference between private pre-discussion position on an attitude scale and the position later agreed unanimously by the group, they found high F White *Ss* shifted more than the low F White *Ss*; while Negro *Ss*, irrespective of their authoritarian score, remained unaffected by the experimental conditions.

CONCLUSIONS

Since the first review on individual differences and conformity by Mann (1959) there has been a steady increase in research in this area. Present review has covered the time period of 1958 to 1973. It has included seven individual differences domains (as against 4

TABLE
Summary of Findings¹

Personality Characteristics	Positive Relationship	Negative Relationship	Curvilinear Relationship	No Relationship	Relationship mediated through situational variables	Relationship mediated through personality variables	Total
Birth Order ²	7	4	—	—	3	—	14 (13.32%)
Age	—	4	2	2	1	1	10 (9.52%)
Sex ³	12	—	—	2	4	4	22 (20.84%)
Intelligence	—	4	—	2	—	2	8 (7.61%)
Self-esteem	3	7	4	—	5	4	23 (21.58%)
Need-achievement	—	3	—	1	5	—	9 (8.55%)
Authoritarianism	13	—	—	—	6	—	19 (18.17%)
Total	35 33.34%	22 20.94%	6 5.71%	7 6.57%	24 22.86%	11 10.48%	105

¹In as much as some of the studies reviewed here have reported more than one finding, the number of findings* does not match with the number of studies.

²Following the predominant notion, a positive relationship refers to the first born.

³Following the predominant hypothesis in this area, a positive relationship refers to female sample only.

by Mann) and has reviewed over 80 empirical studies (as against 10 by Mann). The Table summarizes all empirical studies reviewed in this paper according to seven personality characteristics and according to the nature of results.

As can be seen in the Table, research efforts in the seven individual difference domains and conformity have not shown consistent results. Conformity has been found to be positive function of some personality dimensions in some studies, and unrelated, negative, or curvilinear function of the same variables in other studies. Secondly it also seems that the relationship between the seven personality dimensions and conformity is determined via situational variables and other personality characteristics.

It is possible that personality and situational variables may interact in complex ways and may cause differences in the interpretations. Conformity can be closely and/or generally tied to personality. But it is also possible that the personality factors might be quite limited in scope or that the situational pressures are more important. The analysis of the literature reviewed suggests that personality characteristics and the situational variables may be mutually reinforcing. The personality characteristics *per se* do seem to contribute to conformity, but they vary according to the varying influence of several situational and personal variables. Hence the conformity behaviour may not be consistent or universal among *Ss* with specific personality characteristics in varied social situations.

Similar kind of explanation was reached by Hunt (1965). He points out that individual differences are more likely to be most important in their interaction with situational variables. According to him, "Thus it is neither the individual differences among *Ss per se* nor the variations among them, it is rather the interaction among these factors which are important" (p. 83). What Hunt is suggesting is that the individual differences under study and the situations in which they are studied work together to exhibit conforming or non-conforming behaviour.

It is true that for any given situation, individual differences in conformity are observed, and very often these differences have been found to be rather substantial. In our review we have observed this

to be true. It seems that perhaps conformity in one situation is not a very reliable predictor for conformity in another situation. This raises the necessity to look further and more closely at the characteristics of the situations to account for the apparent inconsistencies in the observed pattern of conforming behaviour.

Finally, there are only two individual differences domains that have shown curvilinear relationship with conformity, i.e., age and self-esteem (see Table). Of course, it may not make sense to conceive of curvilinearity in sex and birth order. However, intelligence, need-achievement, and authoritarianism may be related to conformity in a curvilinear fashion if these dimensions are thoroughly explored. Further work in these areas is needed.

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Creativity Research in the Cross-Cultural Perspective

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The authors review research on creativity in the cross-cultural context, stress the need for more research in this direction, and plead for the interdisciplinary approach to cross-cultural research in creative functioning.

Creativity, it is maintained, is an original transaction between an organism and its environment, and for the most human beings the environment is the culture in which they find themselves embedded, like an insect in amber (Fabun, 1968). Culture, as Teicher (1963) believes, is the matrix and the context for creativity, indeed, it is the context for all creative behaviour. Culture, elaborated and developed, makes creativity possible, and in turn, is enriched by creativity. Discussing the importance of culture in the emergence and development of creative potential, Rollo May (1969) very succinctly observed that you can never localize creativity as a subjective phenomenon. You can never study it in terms simply of what goes on in a person. . . . For what is occurring is always a process, a doing; specifically, a process interrelating the person and his world. Torrance (1967) on the basis of historical records pleads:

Historical records are compelling. How can one otherwise account for the great number of creative musicians in the period of a single century in Europe. How can one account for the preponderance

of great artists and sculptors during the Renaissance? Why were there so many inventors in the late nineteenth century? Why does Australia produce so many good tennis players, and Russia so many good women athletes. Why has the past ten years produced so many outstanding Negro athletes? As Reynolds (1958) has pointed out, it is doubtful that the basic potentialities of people vary greatly from one century to another. It seems that many kinds of talent, including creative talent, exist in most populations at any given time. Reynolds explains this by suggesting the principles that 'talent will develop most frequently and to the highest level in the fields that are given heroic character essentially what Plato said in ancient Greece.

Such are the powerful influences of cultural and historical factors in the nurturance of creative development and functioning. It is because of these influences that the nature and number of creative productions showed great variations between cultures and within the same culture at different times (Kroeber, 1944). Since culture has such a pronounced role in creativity development, the understanding and study of cultures in relation to this important human functioning has its own right for research.

Cross-cultural psychological research as Horrocks (1972) has pointed out, is becoming increasingly common and increasingly extensive in scope. But in spite of the fact that the volume of literature on creativity has increased very rapidly since the early 1950's cross cultural creativity research is almost neglected. A survey of the *Psychology of Creativity Bibliography* by Ilavsa (1972) shows that only .58 per cent of literature is devoted to cross cultural explorations. Most of it is buried in master's theses, doctoral dissertations, and other unpublished reports. Of 50 completed comparative studies of creativity, using instruments developed by Torrance (1969), only 12 have been reported in easily accessible sources. In the main, creativity research has been national oriented rather than international.... Few studies have investigated the educational and cultural determinants of creative behaviour in other cultures (Ogletree, 1971).

Cross-cultural research in creativity will, perhaps, answer numerous unsolved questions in this maddeningly complicated area. Such research, as Cropley (1972) maintains, should help in checking out the universality of experimental findings, and in explaining the relationship between various cultural practices and styles and

later behaviour...it will provide a kind of natural laboratory, in which, for example, the variability (or absence of variability) in adult behaviours seen in different cultures can be related to differences and similarities in child rearing in those cultures. It also provides a new vantage point from which to study one's own culture. It should help in "shaking hypotheses free from particular sets of cultural entanglement" (Devereux, Bronfenbrenner and Suci, 1962). Cross-cultural research, in fact, provides new insights into one's own culture. It also helps to discover and explain differences of behaviour and development among human beings, and thus to achieve a deeper understanding of men as a species (Manaster and Havihurst, 1972). When an experiment is conducted to discover functional relationship between variables, it should be carried across cultures for replication. This basic methodological feature in natural sciences and in Russian psychological studies (Brackbill, 1960) is a necessary condition in educational and psychological research (Wu, 1969). It is because of these advantages that Torrance has pointed out that comparative studies of creativity in children have a promise in pointing the way to the creation of conditions that will produce healthier, more creative people.

Torrance, who is a first-line creativity researcher, is also a pioneer in cross cultural creativity research. It is he and his students who have been most active in conducting cross cultural creativity researches. His instruments *Torrance Tests of Creative Thinking* or its predecessor, *Minnesota Tests of Creative Thinking* have been widely used in cross cultural researches. Portions or complete batteries of the tests have been translated into the following 19 languages: Hindi, Tamil, Urdu, Gujarati, Panjabi, Chinese, Japanese, Korean, French, German, Italian, Spanish, Tagalog, Norwegian, Western Samoan, Afrikaans, Turkish, Greek and Malayan. The openendedness of the test tasks and the universality of the stimuli have made them readily adaptable to different cultures and sub-cultures. Children can respond in terms of whatever experience they have had. The test tasks bring out cultural differences, but a test task that would not elicit culture differences would not be very useful in comparative studies (Torrance, 1969).

A massive project report on *Understanding the Fourth Grade*

Slump in Creative Thinking records findings relating to the performance of various cultures on tests of creativity. Besides, the report also records findings about discontinuities in creative growth across various cultures. It was an attempt to investigate the universality of the slump in creative development and functioning at the fourth grade level. For the purpose of cross sectional studies of creative development, seven different cultural groups were studied. "It was thought that data thus derived would help resolve the issue as to whether the fourth grade slump in creative development is culture made or natural or inevitable." The cultures selected for the study were as follows (Torrance, 1973):

1. An advantaged, dominant subculture in the United States (a suburban, all white school in the Minneapolis, Minnesota).
2. A disadvantaged, minority subculture in the United States (a segregated, Negro school in Georgia).
3. An almost primitive culture with a reputation for suppressing creative functioning and development and resisting change (mission and government schools in Western Samoa).
4. A European culture with a history of creative achievement and known to be relatively low in peer-orientation (two schools in West Berlin, Germany, one in a workman's neighbourhood and another in an advantaged, suburban neighbourhood).
5. A European culture with a history of limited creative achievement (two schools in Norway, one in an isolated mountain village and rural areas and another in a suburban area near Oslo).
6. Another English-speaking culture with a reputation for strong authority control and weak peer-orientation (an urban and rural school in Western Australia).
7. An under-developed and emerging culture made up of many rather distinct subcultures with different languages (seven schools in New Delhi, India, each representing a different culture).

Children from the first through the sixth grade, in all seven cultural groups, were administered three figural and six verbal tests, for assessing creative thinking abilities. In most instances, the verbal tests were not administered below the third grade. In all the in-

stances subjects were encouraged to respond in the language and dialect in which they felt most comfortable. Data collection was accomplished in 1960 and 1961, in almost all cases near the end of the school year for the children concerned. The final scoring and statistical analyses were made during the summer and fall of 1967.

*Performance of Various Cultural Groups
on Creativity Tests*

Torrance (1973, in press) made use of all of the data from the creative thinking test performances, and developed an overall creativity index for each of the seven groups described above. All mean raw scores at each grade level were converted to T-score equivalents based on the U.S. Comparison Group data for the fifth grade. A mean figural and a mean verbal score were then compared for each of the seven cultures. The creativity index is the sum of these two means. This procedure resulted in the following mean score and rankings.

TABLE 1

Mean Scores and Rankings of Various Cultural Groups

<i>Rank</i>	<i>Culture</i>	<i>Figural</i>	<i>Verbal</i>	<i>Total</i>
1	U. S. Comparison Group	47.3	49.9	97.2
2	West Germany	45.3	47.2	92.5
3	Norway	43.1	45.2	88.3
4	Western Australia	39.4	42.7	82.1
5.5	U. S. Negro	42.9	37.1	80.0
5.5	India	37.3	42.7	80.0
7	Western Samoa	40.4	38.9	79.3

Converting the mean scores of the fourth grade level on each of the measures to standard or T-score equivalents for each culture (standard scores were based on U.S. Comparison Group data for the fifth grade) following results were obtained. The sum of the standard scores were then obtained and the following ranks resulted:

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TABLE 2
Performance of Fourth Graders Across Cultures

<i>Culture</i>	<i>Total</i>
1. U.S. Comparison Group	350
2. West Germany	341
3. U.S. Negro	307
4. Western Australia	305
5. India	298
6. Western Samoa	295

Table 2 presents information concerning the relative standing of the seven cultures at the fourth grade level on the seven creative thinking variables.

It will be noted that the rankings shift somewhat from variable to variable. These shifts can be explained logically on the basis of the way children at about the fourth grade level are treated in the culture and in terms of what kinds of behaviours are encouraged and discouraged throughout the culture (Lorraine, 1973).

According to these rankings assigned, the U.S. Comparison Group stands highest among these seven cultures; and West Berlin children gave the U.S.A. children a better race than the other groups.

Further analysis of the data showed differential levels of functioning on the figural and verbal measures of fluency, flexibility, originality and elaboration. The more highly developed cultures such as the U.S. advantaged culture, West Germany, Australia, and Norway stand separately from the more underdeveloped cultures such as the U.S. Negro Group, Western Samoa, and India on elaboration.

In the more developed cultures, complexity and elaboration are required for satisfactory adjustment. In the less developed countries, such complexity of thinking might be maladaptive. Something simpler is frequently more effective in these cultures.

Except for India, children in the underdeveloped countries performed quite poorly on the verbal tests. The U.S. Negroes are among the best on figural fluency and originality and lower than

any other group on the verbal measures. 'Throughout the interview . data supplied by the teachers, observed Torrance, and the independent cultural studies, there were indications of differential treatment for boys and girls....Already, an examination of the data from the U.S. Comparison Group suggests a general superiority of boys over girls on figural elaboration and the verbal measures in the upper grades. In two independent studies in India, Prakash (1966) and Raina (1969) found that boys excelled girls on almost all measures, especially the verbal ones.

A cross-cultural study of 'creativity tests' with 11-year boys was made by Vernon (1966). The short individual battery of 5 tests was given individually during 1965 to the following, somewhat unusual sample, totalling 230 boys. One hundred fourth-year boys in 4 junior schools in or near St. Albans, Hertfordshire, chosen to be broadly representative of S.E. England (age range 10:10-11:10, median 11:4). Twenty Hebridean boys from predominantly English-speaking, and 20 from predominantly Gaelic speaking homes in four schools in or near Stornoway, Isle of Lewis (age range 10:5-11:8, median 11:1). Forty Canadian Indians, including 18 members of the Stony tribe at Morley reservation and 22 members of the Blackfoot tribe at Cluny reservation, S. Alberta (age range 10:1-11:1). Fifty Eskimo boys in Canadian North West. These included 12 at Tuktoyaktuk, a port in Arctic ocean. The remainder of the samples (38) were attending school at Inuvik, on the Mackenzie Delta. Thirteen were permanently resident in Inuvik town, while 25 were boarders brought in for nine months of the year from settlements up to a thousand miles away. Tests used were: The Rorschach Inkblot Test, The Incomplete Figures Test, The Tin Can Test, 'If I could fly' Test; and 'The Dog that could not Bark' test. The results showed that there was more overlapping in the content of response between the various cultural groups than had been expected. The Hebridean samples generally resembled the English apart from low scores on the 'Incomplete Figures' Test. But Gaelic-background boys showed some restriction of creative imagination on several tests. Both Eskimos and Indians, though coming from very poor economic and cultural background and being retarded in English, were often as high in ideational fluency as the English

reference group, or higher, though the quality of those associations or stories was poor. The Indians in particular showed strong preservation and lack of originality which can probably be attributed to their lack of cultural stimulation, extreme conservatism and non-co-operation with the white civilisation. Eskimos, however, obtained scores on several originality variables comparable to those of the British samples. This, as Vernon believes, fits in with their greater adaptability and initiative relative to the Indian groups.

Ogletree (1971) made a cross-cultural examination of the creative thinking ability of public and private school pupils in England, Scotland, and Germany, using a total of 1165 third through sixth-grade children (666 state and 499 Steiner school pupils), they were drawn from six state and six Steiner schools in England, Scotland, and Germany, were matched according to socio-economic background, when the data were examined by age, grade level, sex and with country, and cross-culturally. Subjects were administered the TTCT orally in their native tongue. The battery gave scores for verbal and figural fluency, flexibility, originality and elaboration. The data analyzed by single way and two way analysis of variance produced the following results: Steiner school pupils obtained significantly (.05) higher verbal and figura scores on the creativity tests than State school pupils on a cross-cultural basis. This significant difference in scores between children of the two school systems, favouring the Steiner school was evidenced with few exceptions, when analysed by social class, country, grade level, age and sex. The English sample scored significantly higher on most of the creativity measures than their Scottish and German peers. German pupils surpassed Scottish pupils on the verbal measures, and conversely, Scottish pupils outscored German and English pupils on the figural measures.

Using middle and working class families in Bombay, India, Minneapolis, Minnesota and San Juan, Puerto Rico numbering 64, 64 and 45 respectively, Strauss (1968) tried to investigate the comparative performance of these two groups in each culture on an experimental problem situation. The problem presented to the family, and modified to suit local conditions in each society, was a puzzle in the form of a game played with pushers and balls. In all the three societies, as the data in the following Table indicate, middle

class families exhibited greater creativity, (i.e., large number and range of ideas for solving the problems) than did the working class families.

TABLE 3
Social Class Differences in Family Creativity

Sample	Social Class	Mean Creativity Score	F	P
Bombay	Middle	24.4	5.13	.05
	Working	20.5		
Minneapolis	Middle	10.3	6.18	.05
	Working	11.5		
San Juan	Middle	24.4	7.73	.01
	Working	21.3		

Strauss and Strauss (1968) theorized that children's creativity varies according to the degree to which the child family role require conformity to conventional norms. Creativity was measured by the ability to generate ideas which might solve a puzzle presented to family groups. Data for 128 Indian and American families showed that the Indian children had lower scores than the Americans. Girls' scores were lower than the boys in both societies, while sex differences in creativity were greatest in India. The smaller sex differences in American sample is interpreted as reflecting the greatest freedom and individuality permitted in American girls. It is concluded that individual creativity is likely to increase as societies move toward a less restrictive normative code.

Singh (1970) made a cross-cultural study of creative abilities in India and American children using *Metfessal Individual Test of Creativity*. Data were gathered from Banaras and Tempa. The hypothesis that there would be significant differences in measures of components of creativity between advantaged and disadvantaged children, regardless of culture, was partially substantiated. There were significant differences at the .05 to .01 level in favour of advantaged children on flexibility (performance), originality (verbal),

and originality (performance), and in favour of the disadvantaged on the .05 to .01 level on redefinition (verbal), redefinition (performance), fluency (verbal), sensitivity to problems (performance), and elaboration (verbal). There were no significant differences found on fluency (performance), sensitivity to problems (verbal) and elaboration (performance). The investigator further found that disadvantaged children, regardless of culture, (a) do not necessarily score low on the verbal part of the creativity test, and (b) with an increase in socio-economic status, abilities such as flexibility and originality, excel at the cost of redefinition, fluency and sensitivity to problem and elaboration.

Making an exploratory comparison between Amish and Urban American school children Lembright and Yamamoto (1965) used a battery of tests of creativity thinking with 43 Amish and Urban American children in the fourth, fifth and sixth grades. Results showed both qualitative and quantitative differences in these two groups' performance, obviously reflecting their respective environment and sub-cultures.

Mari (1971) designed a study with a view to compare modern American with traditional Arab rural eighth grade students in their creative ability. The comparison was three-fold: determining cultural differences in creativity, sex differences within and between groups and within group variation. These differences were examined in light of the groups' different socio-cultural backgrounds considering particularly the factors of socialisation and cultural values, family structure, and level of technological development.

Sixty American (30 male and 30 female) and 60 Arab (30 male and 30 female) eighth-grade students from farming families in rural areas were Ss. All Ss. were administered *Torrance Tests of Creative Thinking*. The results of the univariate and multivariate analyses of variance showed the following: (1) Overall, American Ss performed significantly better than Arab Ss in all problems, although on two out of the thirteen specific scores the differences were not significant. These are fluency in unusual questions and fluency in Picture Completion. It was believed that test limitation was a factor which led to these two non-significant findings. (2) Arab males performed significantly better than Arab females in 9 out of 13 scores. The

four non-significant sex differences were in fluency (Unusual Questions), fluency and flexibility (Picture Completion) and originality (Unusual Uses). Within the American group, on the other hand, there were no significant sex differences except in fluency and originality on one verbal problem only, Unusual Questions, and in favour of females. (f) American Ss differed from each other significantly more than Arab Ss. This result was explained in terms of differences between modern society where individuality is encouraged and required traditional society where similarity and group orientation are encouraged and individuality is punished. (4) American females varied more than males, but the difference was not significant. The picture is reversed in the Arab Group: males varied significantly more than females. It seems that, in traditional society, females are subjected to stronger demands for conformity.

Cross-cultural research of Mexican and American students, of approximately the same age and academic attainment, was conducted to determine the Mexican seminary students' relative causal and creative thinking skills (Stevens, 1970). Creative and causal thinking factors were treated statistically by the least squares analysis of variance. No significant differences were found for the main effect: nationality for the fluency, flexibility, or originality factors as measured by the *Torrance Tests of Creative Thinking* or for the causal thinking factor of the BARSIT. The main effect: nationality by sex revealed more differences between Mexican men and women than American men and women on causal and creative thinking. The null hypothesis of no significant difference between Mexican and American students in creative thinking skills was not rejected.

Indirect evidence about the performance of various cultural groups on tests of creativity has been presented by Walker, Torrance and Walker (1971) and Langgulung and Torrance (1972) in the *Journal of Cross Cultural Psychology*.

Fourth Grade Slump Across Various Cultural Groups

Torrance (1969) reports that in the United States as well as in Britain several investigators long ago noted rather severe discontinuities in creative functioning at ages nine and ten. These investigators concluded that it was natural phenomenon and that

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"nothing can be done about it." In an attempt to investigate the universality of the creativity slump at the fourth grade level, cross sectional studies of creative development were conducted in each of the seven different cultural groups described earlier.

Cross sectional developmental curves were constructed for each culture and subculture. The sharp decrease in performance found in the U.S. dominant culture samples (Minnesota and California) was not found in other cultures. Some cultures showed slump at other points; some showed a high degree of continuity, others showed little or no growth between the first and sixth grade.

The overall indexes in standard or T-score units also provided a helpful way of examining the continuity and discontinuity phenomena. The data summarised are as follows:

TABLE 4

Comparison of the Mean Figural and Mean Verbal Scores for Each Culture at Each Grade Level Expressed in Standard (T-Score) Units

Culture	1ST GR.		2ND GR.		3RD GR.		4TH GR.		5TH GR.		6TH GR.	
	Fig.	Fig.	Verb	Fig.	Verb	Fig.	Verb	Fig.	Verb	Fig.	Verb	Fig.
U.S. Comp.	43	48	47	54	44	46	50	50	51	50		
Germany	43	41	43	42	46	42	59	49	40	57		
Norway	40	44	43	41	44	49	46	45	43	46		
Australia	39	40	36	40	39	42	41	44	41	45		
U.S. Negro	33	43	40	37	48	36	..	36	..	40		
India	32	34	36	42	42	42	43	40	37	48		
West Samoa	36	40	40	38	42	37	42	39	43	41		

Speaking in rather general terms, the U.S. comparison group showed decreases in both the figural and verbal measures between third and fourth grades and showed some recovery between the fourth and fifth grades. Torrance records:

The German children experienced a slight slump in the second grade on the figural measures and reached an apex in the fifth grade. Their most serious decrease occurred between the fifth and sixth grades on the figural measures. During this period, however, there was a considerable increase in performance on the verbal measures.

The Norwegian children experienced a slump in figural per-

formance in the sixth grade and one in verbal performance in the fifth grade.

The Australian subjects showed a fairly severe slump in figural performance in the third grade, but showed no slump in verbal performance. The U.S. Negro children showed no slump through the fourth grade on the figural measures, but data for the fifth and sixth grades on the verbal tests were not obtained. There was little increase or decrease in verbal performance until the sixth grade.

The subjects in India showed their slump in figural performance in the sixth grade. As with the Negro group, there was little change in the level of verbal functioning until the sixth grade at which time there was an increase of almost a standard deviation.

Among the Western Samoans, there was little growth reflected on the figural measures except between the first and second grades. At no time was there much growth on verbal measures.

The mean developmental profiles show significant departure from linearity in almost all of the seven cultural groups. Torrance believes that in the more disadvantaged cultures such as Western Samoa and the U.S. Negro groups, the departures from linearity seems to have resulted from a lack of growth. In most cases, however, the departure from linearity seems to have been associated with sharp decreases in performance at some grade level, the grade level varying from culture to culture, but generally occurring at about the end of the third or beginning of the fourth grade. After studying the specific groups within the larger samples separately, Torrance found that continuities and discontinuities of development occur with considerable clarity. This is also illustrated by Johnson's (1968) analyses of development in the mission schools with their discontinuities in contrast to the highly continuous culture of the isolated government schools where traditions are staunchly maintained and a recently acquired alphabet had little impact. This is also illustrated in the analyses of Prakash (1966) in India. Where British and American influences have been strongest, records Torrance, the discontinuities are clearest, where the native cultures and language predominates, the continuities are clearest.

In India, children in Sikh and other native culture schools showed continuity in development while the fourth grade slump

was apparent in mission schools and in private schools, both reflecting strong British influences. In the first three grades, children in the latter schools functioned at a higher level than those in native culture schools, but showed little or no growth thereafter.

Racial Comparisons

One of the advantages of the Torrance Tests of Creative Thinking is that the open-ended nature of the test tasks and the nature of the stimulus material assures disadvantaged children a fair chance to demonstrate their creative potential. These have been used in various researches where comparisons, in terms of either of race or socio-economic status or both, have been made. Most racial comparisons have involved black and whites drawn from the same geographic areas and such studies have been conducted in a variety of geographic areas. In Wisconsin, Cheek (1970) administered both the figural and verbal forms of the TTCT to 600 children in fourth, seventh, and twelfth grades. He found no statistically significant differences between black and white children on any of the measures. In Florida, Covington (1969) with lower class boys aged 15-18 administered the figural form of the Torrance tests to 109 whites (mean IQ=117) and 74 blacks (mean IQ=100). He found no differences between the black and white boys on any of the measures, in spite of the fact that the mean IQ of the whites was 17 points higher than that of the blacks. He found no differences due to father's or mother's level of education. In a rural Georgia town, Richmond (1968) with small samples of eighth grade youngsters found that the whites excelled the blacks on the verbal measures of the TTCT, but that there were no differences of figural fluency, flexibility and originality. The black students excelled white ones on elaboration. Torrance (1967) administered his verbal and figural batteries to the total population of a segregated black elementary school in middle Georgia (grade 1 through 7) when compared with children in an elementary school in a relatively advantaged Minneapolis suburb, the black children tended to excel their white disadvantaged counterparts on measures of figural fluency, flexibility and originality. The reverse was true of figural elaboration and all of

the verbal measures. The black Georgia and the white Minnesota samples were both tested in 1960 under rather formal school situations, when the black Georgia sample is compared grade by grade with a rather typical white Georgia sample, the differences in favour of the whites on figural elaboration and the verbal measures tended to fade out. This observation was further suggested in a study by Langgulung (1971) comparing black and white samples in the Metropolitan Atlanta area. He found no differences in performances of blacks and whites on the Ask-and-Guess Test. Torrance (1970) used verbal tests in connection with creativity workshops involving black disadvantaged children. Under the very informal and free atmosphere of the creativity workshop and in individual testing situations, the verbal creative thinking performance of these children reached a level commensurate with advantaged children under similar conditions. Since that time Torrance and his students (e.g., Aliotti, 1969 and Nash, 1971) have experimented with a variety of warm up techniques with black children in ghetto schools designed to facilitate verbal creativity with promising results. Another study by Iscoe and Jones (1964) using 287 Texas white and Negro school children using *Unusual Uses Test* from five to nine years old, showed that Negro children were superior in ideational fluency even though the white children in the study had higher IQ's. Flexibility scores showed no overall relationship with age or race. Such encouraging results led Torrance to observe that disadvantaged too have creative positives of their own.

Perception about Creative Personality in Different Cultures

One of the powerful ways of ascertaining whether a culture encourages or discourages creative behaviour is the way by which teachers and parents encourage or discourage, reward or punish certain personality characteristics as they develop in children—or the behaviours which manifest those characteristics (Torrance, 1965). Using his 'Ideal Pupil Checklist', Torrance (1965) studied teachers and other educators from five rather distinct cultural groups. The United States sample consisted of 264 educators in the Buffalo, New York area. Since the rankings of this group correlates highly with

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the ranking of teachers in other States of the U.S., Torrance concluded that they were obtaining a measure which possesses a great deal of cultural commonality within the United States. The German sample consisted of 94 elementary and secondary teachers in Berlin, the sample from India consisted of 375 elementary and secondary school teachers in Baroda area, the Greek sample consisted of 94 teachers in the area around the city of Volos, and the Philippine sample consisted of 147 teachers in training centres. In order to measure each set of rankings against the expert ratings for the Ideal Creative Personality, each set of rankings was transformed into the Q-sort distribution and then correlated with the expert ratings for the Ideal Creative Personality, each set of rankings was transformed into the Q-sort distribution and then correlated with the expert ratings by standard Q-sort procedures. By examining the following list of the two most valued characteristics of each group, some of the major cultural values become apparent.

TABLE 5
Ten Characteristics Liked Most by Various Cultural Groups

<i>United States</i>	<i>Germany</i>	<i>India</i>	<i>Greece</i>	<i>Philippines</i>
Independent in thinking	Sincere	Curious	Energetic	Industrious
Curious	Sense of humour	Obedient	Strive for distant goals	Obedient
Sense of humour	Industrious	Does work on time	Thorough	Courteous
Considerate of others	Independent in thinking	Courteous	Sincere	Healthy
Industrious	Attempts difficult task	Healthy	Non-conforming	Considerate of others
Receptive to other's ideas	Independent in judgment	Self-confident	Remembers well	Does work on time
Determination	Curious	A self-starter	Healthy	Self-confident
Self-starter	Self-confident	Industrious	Altruistic	Remembers well
Sincere	Healthy	Affectionate	Self-confident	Willing to accept judgment of authorities
Thorough	Adventurous	Determination	Courteous	Affectionate

Missing from all except the United States and German lists are such characteristics as 'independence of thinking' and 'independence of judgment.' Curiosity ranks high in Baroda group, but does not enter the top ten characteristics of the Greek and Phillipines teachers. In the Indian list, however, "curiosity" is immediately followed by "obedient" "does work on time" and "courteous", "Remembers Well" appears in both the Greek and Phillipines lists, but not in any of the others.

Coefficients of correlation were computed between the composite ratings of each culture with the expert sort, since it was felt that a better index of the extent to which the values of each culture conform to creative values as measured by expert sorts of the Creative Personality, could be obtained. All of the coefficient of correlation are low, indicating that according to expert judgement, all five of the cultures contain values which are inimical to creative development and behaviour. The United States and German teachers appear to have less than the other groups, however, with India, Greece and the Philippines following in that order.

TABLE 6

Coefficients of Correlation between Composite Group Ratings of Five Different Cultural Groups with Composite V-sort Ratings of Experts on Creative Personality

<i>Cultural Groups (Teachers)</i>	<i>Number</i>	<i>Coefficients of Correlation</i>
Buffalo, N.Y., United States	264	.51
Berlin, Germany	93	.47
Baroda, India	375	.35
Volos, Greece	94	.32
Manila, Philippines	147	.30

Concluding the results, Torrance observed that all five cultures according to this standard, may be unduly punishing the good guesser, the child who is courageous in his convictions, the emotionally sensitive individual, the intuitive thinker, the individual who regresses occasionally and plays or acts childlike, the visionary individual and the person who is willing to accept something on mere

say-so without evidence. On the other hand, all of them may be giving unduly great rewards for being courteous, doing work on time, being obedient, being popular and well liked and being willing to accept the judgement of authorities.

Raina and Raina (1971) designed a study to determine what concepts teacher educators in India have of the ideal student in terms of what characteristics they believe should be encouraged and discouraged and compare the results with the concepts of teachers in the United States. When the 62 characteristics of the checklist were ranked, a rank order coefficient of correlation of .76 was obtained between the rank assigned by the Rajasthan teacher educators and the United States teachers. In general, it was concluded, that Rajasthan subjects emphasized the receptive nature of man and deemphasized man's self-acting nature more than United States teachers. Similar findings using prospective teachers were obtained by Raina (1970).

Raina (1972) attempted to make a cross-cultural study of college teacher perception about creative student using University of Indore teachers and teachers in Minnesota.¹ Besides this comparison, rank order correlations were worked out between the ratings of India teachers and teachers from other countries. Correlations were also run with the expert ratings. Results, by and large, support the earlier findings.

A cross cultural study of the parental perception about ideal child was made by Raina (1973, in press). The perceptions of the Indian and American parents were compared and Table 7 (p. 158) presents the most valued and least valued characteristics by the two groups of parents.

When the 62 characteristics of the check-list were ranked, a rank-order coefficient of correlation of .75 was obtained between the ranks assigned by Indian mothers and American parents; and .11 between the ranks of Indian parents and experts on creative personality. Both Indian and American parents emphasized conformity, obedience, receptive nature of man and deemphasized independent judgment, guessing and non-conformity. Besides these

¹The author is grateful to Dr. Paul Torrance for supplying data concerning this group.

TABLE 7

The Most Valued and Least Valued Traits of the Ideal Child as Perceived by the Indian Mothers and American Parents

<i>Most Valued</i>		<i>Least Valued</i>	
<i>Indian Mothers</i>	<i>American Parents</i>	<i>Indian Mothers</i>	<i>American Parents</i>
1. Healthy	Healthy, Considerate	Disturbs	Haughty, Disturbs
2. Does work on time	Sense of humour	Negativistic	Fault-finding
3. Courageous in convictions	Sincere	Fault-finding	Negativistic
4. Adventurous	Self-confident	Stubborn	Stubborn
5. Courteous	Courteous	Timid	Critical
6. Obedient	Determined	Critical	Bashful
7. A self starter	Independent in thinking	Unwilling to accept anything on mere say-so	Timid
8. Self-confident	Industrious	Bashful	A good guesser
9. Popular, Well liked by peers	Curious	Talkative	Talkative
10. Attempts difficult tasks	Obedient	Non-conforming	Emotional

studies a number of cross-cultural studies are underway by Paul Torrance where he has used his Ideal Pupil/Child Check-list.*

Comparative Studies of Creative Achievement and Motivation

Data from studies of the relationship between the level of creative functioning in eleven cultures and the extent to which each culture values creative achievement as indicated by adult encouragement-discouragement behaviour and the availability of occupational outlets for creative activity, has been presented by Torrance (1969) recently.

Torrance Tests of Creative Thinking were administered to children from grades one through six in each of eleven cultures or sub-cultures. In each comparison group, from 500 to 1,500 children were administered the tests. Teachers of these children were administered the Ideal Pupil Checklist, and children in grades three through six were asked to indicate what kind of work they would

*Personal Communication, March 1972.

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like to do when they left schools. Besides the seven cultures described earlier, the following cultural groups were also studied:

1. A school system representing a racially mixed, advantaged and disadvantaged culture in the United States, located near Los Angeles, California. Samples were drawn from several different elementary schools in such a way as to represent the system.
2. Chinese schools in Singapore representing an old and relatively creative culture in a heterogeneous urban area.
3. Malayan schools in Singapore representing the native culture in a heterogenous urban area.
4. Tamil schools in Singapore representing a third culture located in the same heterogeneous urban area.

The level of measured creative functioning was determined by converting all mean raw scores at each grade level to standard or T-score equivalents. The overall creativity index for each culture was computed by adding the figural and verbal means, which are presented in the following table in column one. The rank order coefficient of correlation between the rankings obtained from the experts on the creative personality and the teachers are given in column two, with the subsequent rankings based on the coefficients given in column three. Column four and five give the occupation index and subsequent rankings for each culture.

TABLE 8
Overall Creativity Indexes in Order of Descending Rank, Ideal Pupil Indexes on Creativity Criteria, and Rankings for Ten Different Cultures, and Occupational Indexes on Creativity Criteria and Rankings for Eleven Different Cultures

Culture or Sub-Culture	Creativity Level Index	Ideal Pupil		Occupational Index	Aspi- rations Ranking
		Index	Ranking		
Minnesota, U.S.A.	97.2	.43	1	47	1
California, U.S.A.	96.2	.40	2	31	2
West Germany	92.5	.37	3	30	3
Norway	88.3	—	—	14	5
China, Singapore	84.5	.28	5	11	7
Tamil, Singapore	82.4	.28	5	11	7
Western Australia	82.1	.10	8	21	4
Malays, Singapore	81.0	.28	5	11	7
U.S.A. Negro	80.0	.21	7	10	9.5
India	80.0	.11	10	10	9.5
Western Samoa	79.3	.17	9	7	11

When the first two set of rankings (the ordering of column one and the rankings indicated by column three) are correlated, a coefficient of .94 is obtained. The second two sets of rankings (the ordering of column one and the rankings shown in column five) yield a rank order coefficient of correlation of .95. The rank order correlation between the index and overall creativity indexes based on the *Torrance Tests of Creative Thinking* indicate a close correspondence and supports the contention of Plato: "What is honoured in a culture is cultivated there."

Divergent Thinking Reflected in the Imaginative Stories of Children in Various Cultures

As a part of cross cultural researches, Torrance (1967) and his students (Luthra, 1966; Karoussos, 1961; Tan, 1964) made children of three grades (fourth, fifth, sixth) write imaginative stories about animals and people with divergent characteristics. Analysis and coding of these stories was based upon the assumption that they acted as a form of projective technique, children revealing in fantasy material their perceptions about divergent behaviour and how their culture deals with such behaviour (Torrance, 1967). Comparisons were made with subjects of three grades in the comparison schools. Students from Twin Cities, Negro schools, Berlin, Norway wrote out stories which have been analyzed by Torrance (1967) in his report. Results concerning Luthra's research on concepts of divergency reflected in the imaginative stories of children in New Delhi, India, and Twin Cities are as follows: There was a significant difference in the perception of pressure against divergency in the stories of two groups. Contrary to the original assumption, the Twin Cities group showed more awareness of pressure against divergency than the Delhi group. The two groups presented a significant difference in the sources of pressure against divergency. In the case of Delhi children, pressure emerged mostly from specific persons. The pressure exerted by society was in second place, but fairly strong as compared with the Twin Cities children. Differences in the nature and form of pressure against divergency were significant. In the five separate categories (power, internal force, challenging situation,

hostility and therapy), hostility and power were most frequently used by Delhi children while therapy, internal force and challenging situation occurred most commonly as pressures in the stories of the Twin Cities children. Both the groups perceived psychological pressures considerably more than purely psychological ones. The comparative data indicated large overall differences between the two groups concerning the consequences of pressure against divergency. Contrary to the assumption that Delhi children perceive more conformity and less resistance to pressure, the group reacted to pressure against divergency with more resistance and less conformity. The Twin Cities children, perceived more conformity and less resistance. There was a significant difference in the concern about the causes of divergency between the two populations. A majority of the Twin Cities children showed a great concern for the causes of divergent behaviour, while the Delhi group showed least concern for the causes of divergency. The two groups differed markedly in the explanation for the causes of divergency. Delhi children reported good naturedness, supernatural occurrences, magic and anger quite frequently in their stories, while the Twin Cities group attributed divergency more frequently to illness, inadequacy, accident, science and fear. The data showed that Delhi children more frequently than Twin Cities children perceived positive values of the divergency to the divergent subject. There was a highly significant statistical difference between the two groups in their evaluation of the consequences for the society. Both groups tended to attribute negative value to divergency for the society rather than positive and neutral values. Negative values were more pronounced for the Delhi children than for the Twin Cities children.

Anderson and Anderson (1961) have been concerned with the effects of what might be called a "national personality type" on children's responses to open-ended stories. They have been interested in creativity from the point of view of social creativity in human relations. Using *Anderson Incomplete Stories* each depicting a conflict between a child, his teacher, his parent, neighbour, or peer, they have gathered data from large number of children over 10,000 in fourth and seventh grades from eight countries: England, Finland, United States, Sweden, Norway, Mexico, Brazil and Germany. They

have found large and significant differences consistent with their hypotheses about the impact of the culture on creativity.

Conclusions

Each culture, as Ross Mooney (1969) maintains; has a "logos". It is, perhaps, this logos which either acts as a catalytic force or as a deterrent to the development and expression of creativity. It is because of this logos that cultures differ in the specific activities which they encourage and stimulate and value. The "higher mental processes" of one culture may be relatively worthless "stunts" of another (Anastasi, 1949). It is this logos which provides for different models and different notions of creativeness stemming from varying intellectual and philosophical traditions. For example, Hindu and Western notions of creativeness may differ because:

Indian culture provides few scientific and mathematical models of creativeness which stand evidence for a theory; whereas in the West scientific method becomes synonymous with problem solving... Thus, the emphasis on science in the West associates creativity with inventiveness, the religious tradition in India with spiritual realization (Hallman, 1970).

Cross-cultural creativity researchers should be careful about the fact that the abilities differ and Western middle-class is not the only one (Vernon, 1969); and that the behavioural functions measured by tests other than those at a psychophysiological or sensory level are all culturally determined (Biesheuvel, 1969). This is amply proved in Cole, Gay, Click and Sharp's recent meticulous work on *The Cultural Context of Learning and Thinking: An Exploration in Experimental Anthropology* (1971). They follow what they call the "common sense dictum" that people's skills at tasks will differ with the culture's emphasis on such tasks, and argue that these "tests and experiments (are) specially contrived occasions for the manifestations of cognitive skills.... Failure to apply the skills becomes not an illustration of cultural inferiority, but rather evidence that the skills are available, but for some reason the content (of the tests) does not trigger their use. Similar opinion was expressed by Vernon, writing for the Toronto Symposium on Intelligence in 1969. But cross cultural research should make it possible to investigate the re-

relationship between specific environmental influences and specific abilities. Thus, we can hope to advance our knowledge of the effects of different kinds of conditions on different abilities, particularly if we apply a range of varied test to a member of contrasted group.... As the studies of this kind accumulate, our inferences will become more soundly based and we should be able to do more to help backward people to progress by diagnosing the underlying cause of their retardation (Vernon, 1970).

In addition to the above, some of the following need serious attention of the cross cultural creativity researchers:

1. Studying the effects of different background conditions on abilities listed in the S-O-I model, and particularly creative ability.
2. Comparison of creative works when there is consistent *Weltanschauung* and when one is lacking, or when there is a conflict of philosophies (Stein, 1967). This should, perhaps, mean sort of "temporal" cross cultural studies.
3. Child rearing practices and creative development across various cultures.
4. Comparative studies of creativity in public school and traditional school students to answer question about continuity and discontinuity.
5. Motivational and cognitive styles of the creative persons across culture who break out of their cultural milieu and cultural envelop, i.e., transcendence of cultural background.
6. Pluriculturalism (Crompton, 1973 in press) and creativity.
7. Training for creativity and cultural effects.
8. Cultural change and creativity.
9. Malnutrition, cultural deprivation and creativity.

There is much room for more studies on cultural determinants of creativity and such studies should help develop "anthropology and sociology of creative thinking" (Yamamoto, 1969). It is suggested that while making cross-cultural exploration, researchers from various disciplines need to collaborate, otherwise it may prove to be a love's labour lost. Interdisciplinary approach to cross cultural research may, perhaps, solve many issues. Cole *et. al.* (1971) too proposed that educators may capitalize on the anthropologist's ex-

perience and method in delineating settings and descriptions in natural settings and descriptions in natural arenas in ways that are not culture bound and on the psychologist's experience in designing experiments and measuring outcomes. Without the first, no meaningful instrument or experiment can be designed, without the second, intuitive hunches go untested. We feel that we can learn more together than we can separately.

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BOOK REVIEWS



Education and politics in India

Education and Politics in India—Studies

In Organisation, Society and Policy.

Edited by Susanne Hoebel Rudolph and Lloyd Rudolph,
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In this review, our attention will be centred, as is perhaps appropriate, on the theoretical propositions of the editors. These have been spelt out in the six chapters in Part I: "The political system and the educational system—an analysis of their interaction" and in the sectional introductions to Part II: "Educational institutions in their social and political environment", to Part III: "Political dimensions of university government" and to Part IV: "Professional constraints on politicisation of education". We shall also take note of a few of the papers themselves, to clarify further the basic conceptual and methodological issues raised by this virtually maiden attempt to offer academically respectable account of the relation of education to politics.

The Rudolphs seek to define the scope of enquiry in terms of three relationships, viz., "politicisation of educational structures, political influence exercised by the educational structures and assertion, by the state, of a public interest in education" (p. 8). Politicisation, they define as "appropriation of educational structures and resources, and the displacement of educational goals by organised political and community (religion, caste, locality) interests". This they see as part of the larger process of excessive politicisation in India to almost "pathological" levels, i.e., to a point where the political institutions can no longer handle the burdens and conflicts and involve within themselves institutions, such as educational ones, which, according to the Rudolphs, are not appropriate to it. In respect of method, they draw attention to two ideas, viz., comparison and disaggregation. They compare, sporadically and inadequately, in the view of the reviewer, "India with herself over time;...with other countries at the present moment;...with other countries at other historical moments which for one specific reason

or another, appear more relevant than the present" (p. 10). Their efforts to disaggregate, i.e., not always to see India as a whole, but to review regional pattern and developments as a device for illustrating the broad phenomenon, are much more substantial (Ch. 5, "Regional Patterns of Education") and are well taken. The distinction between "rimland" (essentially coastal areas Bengal, Madras, Bombay where British influence was most deeply felt) and "heartland" noted by them is though not without its difficulties, e.g., the case of Mysore, initially plausible but it only provides an opening, as it were, to a more substantive discussion of differences in social structure, culture and economy which underlie, and also combine with, the historico-geographical heartland-rimland dichotomy to produce the variations that we observe.

This is the point to comment on our reservations to Rudolphs' view of politics. It is politics *minus* economics, that is to say, politics is conceived as if it were independent of economic bases. It is, in fact, seen, as illustrated by their mention of religion, caste, locality (p. 8 cited earlier), at times, as competition between groups, which is fair enough as far as it goes. But it does not go far enough. For, with all the qualifications that psychological or behaviourist political science might introduce, the significance of class as socio-economic formation, the importance of means and relations of production in determining political relationships, i.e., those of power, cannot be underrated. Even when one concedes the points of substance in Rajni Kothari's view of the autonomy of the political factor (see *Politics in India*, Delhi: Orient Longmans, 1970), and asserts as the Rudolphs do not assert, that in the newly emerged underdeveloped world, political factors will achieve a primacy not conceded in classical Marxist theory, (though asserted in the thought and action of all active Marxist revolutionaries from Marx through Lenin and Stalin to Mao and Che), the issue remains that the competing groups and elements in a political situation have to be defined. And here their class identifications are of an importance which the Rudolphs seem nowhere near recognising. The obverse of this non-economic—one might even say, non-political-view of politics is evident from some of their other formulations. Thus, the viewing of politics as mainly competition between groups or parts is accompanied by a

more or less complete denial of any political orientations to the whole. This inevitably leads to simplistic and erroneous implications such as that the educational institutions and resources are not to subserve *any* political goals (p. 8) or that the Central Government in India, or perhaps anywhere, does not promote politicisation (Ch. 6). This is easily seen to be incorrect at every level, whether normative or empirical-factual, or analytical-theoretical. From this error follows the unsatisfying non-political treatment of national educational policy in a federal context offered in Chapter 6. Even statements such as that "central authority (is used) for maintaining standards" (p. 5) are easily belied by recent central government flats setting up new universities. The Rudolphs could not have foreseen events. But the objection really to be pressed is that their theoretical position tends to conflict with events as they occurred. In fact, the broader point that the state has a class content and that there are definite political goals and objectives which the system of education, including higher education, fulfils should have been more obvious to political scientists than is apparent in the entire volume. An analysis of structures of control, of the objectives promoted by ideational as well as the disciplinary content of the curriculum would have been necessary to establish empirically this rather obvious piece of *a priori* political reasoning. That is missing.

The attention given thus far to what the books does not do is justified largely by its centrality to a proper treatment of politics in its relation to education. A comparable lacuna in their treatment of education particularly the higher learning may also be noted. The Rudolphs have treated the university as a transplant of an exotic institution. This is, indeed, one perspective from which to study the matter and they have certainly been perceptive enough to recognise that the "genetic imprint" (on which we comment presently) of the Indian university was bureaucratic and also not free from "politics" (pp. 14-19). In her paper on Indian Educational Service as a study in professionalisation of the higher learning (Ch. 13), Irene Gilbert also clearly brings out the contradictions between the administrative functions and ethos of the Service, on the one hand, and the clearly learned part of the Service (even though concerned primarily with college teaching sometimes modelled on the British residential school idea and frustrating to the few mem-

bers of the Service interested in genuine advancement of higher learning). Both of them also see the contradiction between this "professional" element in higher education and "political" elements whether from government or nationalists. However, a more adequate perspective was possible. The university in Europe emerged from the professionalisation of *indigenous* learning. While it sought autonomy in the guild-like formations of universities (professionalisation), it also sought cultural and political purposes homogeneous with those of the political elite (politicisation) which were, therefore, unstated, implicit. Our authors here fail to note this distinction almost totally, fail to note also the indigenous sources in India of intellect and culture which could have formed the basis of an indigenous university. This, indeed, could not have occurred under British political auspices. Hence, the inevitable linking of the ideal of indigenous university or educational system with the political goals of national independence—and a sort of a genetic imprint in favour of politicisation—again not noted by either Rudolphs or Gilbert. The latter indeed, is clear-headed enough in her treatment of autonomy and consensus (between the IES college men and the government) as the basis of such autonomy at Presidency College, Calcutta, Muir College, Allahabad and M.A.O. College, Aligarh (Ch. 10). But her treatment of the nationalist influences during early 20th century suffers from the handicap just noted. (A related side issue is that in her I.E.S. chapter she notes British administration, Indian nationalists and European academics, but not the non-I.E.S. Indian academics).

The inadequate notice of the indigenous systems of learning and how they failed to get involved in the development of the Indian university system as well as the essentially unsympathetic note of the nationalist movement in its impact on higher education under the British can be related to either a merely ethnocentric bias or to the theoretical weaknesses of their political science noted early in this review which are also reflected elsewhere in the volume. Thus, Part IV containing Gilbert's paper on I.E.S. and Paul Brass' on Ayurvedic education being titled as "Professional Constraints on Politicisation of Education" seems to carry such implications. Incidentally, the treatment of Ayurvedic education could have profited from a com-

parison with Ceylon where, with a narrow apex of university education in English and wide base in elementary mass education, large number of able (rural) intelligentsia were educated in Sinhalese, Buddhist and Ayurvedic institutions who later provided the motor force for the late Bandaranaike's political movement. Indian higher education in English having expanded much more, and lower education much less, a fact itself related to both British policy and indigenous social structure, left much less room for indigenous Ayurvedic education which, as Brass notes, was entered mainly by lower academic and social status groups. His competent treatment of the *shuddh* and integrated schools, i.e., *ayurvedic* medicine appears a little overdrawn and endowed with more significance than it actually has in Indian politics.

Gould's study of the relation of school foundation and political processes in Faizabad district (Ch. 7). Madan and Halber's study of caste and community in private and public management of education in Mysore state (Ch. 8) and Iqbal Naran's study of rural local politics in relation to primary school management (Ch. 9) are all competent empirical studies, in line with the general viewpoint of the book. So are the Rudolphs' own study of parochialism and cosmopolitanism in university government at Baroda (Ch. 11) and Carolyn Elliot's study of the Osmania autonomy dispute. None of this latter certainly feels like documentation of what is common parlance in circles connected with politics and educational administration.

It remains to note an important positive contribution—the concept of the “genetic imprint”—the “assumption that historical traditions and experience create values, culturally defined norms, and modes of behaviour that survive even when the conditions that give rise fade them into the past” (p. 13). This idea need not necessarily have arisen for the first time in a study of the relation of education to politics. It has, indeed, been noted before, e.g., as “inertia in education” (in the reviewer's article “Educational Techniques and Educational Planning in *Educational Sciences*, October, 1967), or in the contribution on History of Education in a recent issue of *Desdoulus*, (*History Today*). The authors have sought to show how the bureaucratic character of universities founded in British days carried over into post-independence period. Such continuities

can be seen in all national system of education even after a revolution—except, possibly, in the exceptional circumstance or a thorough-going cultural revolution. The authors' idea examined mostly in an administrative-political sense, establishing how even political change has not radically altered some fundamental ways in which people behaved in relation to education, deserves further elaboration through study of curricula, of educational practices and of the very idea of what a proper education is. Historians and sociologists of education should have done this before. The comparative examination of the genetic imprints of a wide variety of educational situations is what was missed in the past and might yet be missed in the current enthusiasm for inter-disciplinary study of education by scholars from other disciplines. The authors certainly deserve compliments on this perceptive insight.

The book has long been in process. At the initial seminar in 1967 the chief guests were (from the personal knowledge of the reviewer) Prem Kripal and Triguna Sen. The dedication in the printed version is to "unconventional educator" J.P. Naik (along with David Riesman) who by then had already produced the Report of the Education Commission, but by publication time was much better located in the politics of education and social science research in this country. The Rudolphs are old India hands, in and out of seminar rooms and campuses in this country. The book, as the little episode about the honour just noted, illustrates their perceptive observation of the Indian scene as well as their reaction to it. This intimate knowledge of the political processes and the academic community is reflected both in their own contributions and in those of the others in this volume. The reviewer is, therefore, not called upon to flaw the writers on this count—except, of course, an occasional name, e.g., "J. C. Joshi" (p. 9) for the late Dr. A. C. Joshi, former Vice-Chancellor of Kurukshetra, Punjab and Varanasi universities or "Kapuri Thakur" (p. 80) for Karpuri Thakur, the socialist, former Deputy Chief Minister of Bihar.

The contributors, being anthropologists, political scientists or historians who know their India well through data in the archives or in field work connected with their own disciplines bring a wealth of material to support their contentions or to built up a narrative

which sets a model for research in the historical and social study of education in our universities.

A final impression. As the sub-title implicitly recognises, the studies put together in this volume do not add up to an integrated statement on the politics of education in India. But it certainly lights up important areas of a certain kind of understanding in that field to which our own reservations have already been stated.

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Literature Education

Literature Education in Ten Countries: International Studies
in Evaluation—II.

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Whatever divergence of opinion may exist in considering the role of literature in foreign language learning, few will disagree with its centrality in the teaching of the mother tongue. Indeed, teachers and educators become eloquent over the values which literature (in the mother tongue) has for its youth. However, alongside this general agreement upon the importance of literature education goes a vigorous and widespread criticism over the outcomes of such an education. Indeed, there has been a most bewildering confusion of purposes, methods and materials in the field which blurs the vision of clearly distinguishable educational aims. What, one wonders, is the primary aim in the teaching of mother tongue literature in our schools? Is it the development of a taste and love for literature? Is it to provide the requisite emotional experience and to stimulate creativity? Is it to inculcate certain acceptable cultural values? Is it to develop the skills of critical reading and evaluation? Is it to function as an instrument of the social and ethical development of the child? Or is it, after all, only a means of teaching the basic skills of reading and writing? Definite answers to any of these questions are hard to find, as, in fact, they have not been formulated in clear terms anywhere. An examination of the design of literature curriculum and instructional procedures in our schools also does not yield fruitful results as they are not really based on any set of clearly conceived objectives. It is also unfortunate that no comparative study of mother tongue teaching and evaluation in the various language-areas of our country exists. Presumably the difficulty of formulating the objectives and measuring the outcomes of literature education accounts for the absence of any major study in the field.

Even so, *acculturation* seems to be one of the major aims of teaching literature (teaching about the accumulated cultural achieve-

ment of a people) and if it so, then it should be possible to make a comparative study—an inter-State study, for example,—to determine the values of life reflected in each of the regional language literatures in our country. The findings of such a study, incorporating a systematic analysis of the objectives, instructional procedures and evaluation would have a two-fold value: first, as revealing far reaching implications for the emotional integration of the nation and, second, as paving the way for an efficient planning and teaching of literature curriculum. In order to make such a study possible, it is necessary, first, to develop a viable methodology to evaluate in quantitative terms the seemingly intangible outcomes of literature education in more than a dozen or so different situations.

It is in this context that the massive project on *Literature Education in Ten Countries*, recently completed by the International Association for the Evaluation of Educational Achievement, Stockholm, is of special interest and value to us in India. It has attempted to break new methodological ground in measuring student response to literary works which they study. It is a very brave attempt, indeed, towards the quantification of something so subtle and nebulous as aesthetic reaction. The study has pressed into service sophisticated statistical procedures and data processing. Yet, the findings are tentative and non-conclusive. This was perhaps to be expected. Even the findings of the two earlier large-scale, ambitious studies in the United States, viz., *Studies in Modern Language Teaching* by Coleman and *An Investigation of Second Language Teaching* by F. B. Agard and H. B. Dunkel, were less definitive and helpful than the expectations roused by the sheer magnitude of those studies. There are certain inherent difficulties in any evaluation study on a massive scale. All the variables in the situation cannot be identified and stated, much less controlled. A second major difficulty is that it is almost impossible to repeat the study for the validation of the findings as the time and expenses involved in running them are indeed colossal.

Having noted the inherent limitations of a large-scale project, it is only fair to acknowledge the thoroughness with which this study was executed. Considering its international character, the study can be said to be the most exhaustive one in the field. This in itself

is a commendable achievement in an area where little research has been done and little help is available to the teacher.

One of the major aims of this study was to examine in as much detail as possible the contributions of schools, teachers and curriculum towards the level of *achievement* in literature education. The study also explored factors which accompany differences in achievement between schools and between students in a country. It attempted, besides, the difficult task of investigating cross-national differences in response pattern and the achievement level—the interplay between culture and educational outcomes.

An International Committee consisting of five professors from the USA, the United Kingdom, Sweden and Belgium conducted a survey of the literature curricula of the ten participating countries through correspondence with National Literature Committees. On the basis of this survey, the Committee scrutinized the various aspects that the project could possibly study (namely, the relationship between the stated aims of literature instruction and the relationship of those aims to the place of literature in the nation's culture, the outcomes of literature instruction in terms of cognitive achievement, interests and attitudes, and the patterns of expressed response of individuals to the works they read) and formulated them. Finally the Committee decided to focus their attention primarily on those aspects which deal with (a) the ability of students to read a literary text critically and with (b) the pattern of response that the students expressed about those texts.

Then, on the basis of extensive pretesting and opinion survey, four stories were selected and translated into each of the languages to be supplied to the students of these countries. Four tools were devised to collect data. These were: (a) an instrument to measure the ability to read the literary text critically (a list of 20 questions that covered the entire text were prepared out of which the student had to point out the five most important ones), (b) a battery of multiple-choice questions to test the comprehension of the text and a further set of questions to test the skills of interpretation, (c) a ten-item questionnaire on interest in literature and lastly, (d) a ten-item questionnaire to probe into the degree of transfer that took place between what the student read and his life.

In addition to these instruments, questionnaires were developed for students, teachers and school administrators which would yield information on a variety of factors such as the home background of the students, their reading habits, curriculum, school administration, etc. All these questionnaires and tests were then translated into each of the languages.

For each country, the researchers drew probability samples of two types of populations: (a) students in the age group 14+ and (b) pre-university year students. The scores on the four measures of achievement in literature studies were correlated with the mass of data which the questionnaire returns provided.

The statistical treatment of the data is both sophisticated and elegant and efficient use has been made of regression analysis (in addition to the other usual procedures).

The conclusions reached by the researchers show that cross-national comparison of achievement in literature is possible only in two areas: (a) the patterns of response, and (b) the ability to read text. An even more important revolution is that differences between the mean level of achievement of schools in literature appear to be best explained by community variables such as the socio-economic character of the community and reading resources it can provide for the students. It is interesting to note that staff and curriculum do not figure at all as important factors in the situation. Curiously enough, this is the same kind of conclusion that the Coleman Study arrived at. The factor that emerges as most important to account for the differences in achievement among students is their home background. A great deal of variance among individuals in their ability to read literary texts and in their interest in reading is, however, left unexplained.

An interesting finding of this study is that students across nations exhibit clearly identifiable patterns of response, in that "they choose as important certain responses rather than certain other responses and that they do this in accordance with the texts they read." A corollary of this, the researchers think, is that the literary stimulus determines the reader's approach to it more than had hitherto been believed. This throws up a whole new area for further research. A typology of literary works as to the response patterns they might

elicit can perhaps be developed. In respect of response patterns the researchers have striven hard to emphasize the existence of cross-national and cross-cultural similarities. Yet they have pointed out facts which seem to contradict their own conclusion. For instance, the study reveals that students in Sweden tend to ask more evaluative questions than do students in the United States; students in Italy seem to be more concerned with history and background than do students in Finland. The researchers, however, do not want to draw the inference that national stereotypes exist and suggest that further studies need to be undertaken to explain the national patterns.

Further, the choice of the four short stories chosen to serve as the material for measuring literary achievement of ten different groups of students is itself open to serious question. The themes of the stories are so culture-bound that they cannot be considered to present comparable literary experience or stimulus to the widely differing groups of students. The plight of an immigrant in the United States (in *I see you never*) is surely not a theme which is of universal interest or which could stimulate an American child, an Iranian child and a Finnish child to an equal degree.

Another finding of the study is that the response patterns are a function of the age of the students. The researchers conclude that the differences in patterns between the two age groups result from school education rather than from a general progress through adolescence. This inference, however, is not supported by any convincing evidence or argument.

The study finds that response to literature is a learned behaviour and that it is modified by what the student reads and that it is further affected by his culture, and, presumably by his school as an inculcator of that culture. One surely expected the study to come up with more insightful and less trite conclusions than these. After reading through the long, not very lucidly composed report, when one comes to the concluding chapter one is greatly disappointed. That a massive and ambitious project like this employing all the resources of modern technology and statistical sophistication should come out with such tame findings makes one almost lose one's faith in the value of large scale investigations into an area which is as complex and elusive as literature teaching. The concluding sen-

tance in the report is a masterpiece of equivocation. It runs, "In sum, although the IEA study leaves uncertain the effects of school on the ability of students to read literature and on the students' interest in reading literature in their spare time, it points to the potentially profound effect of schools on the pattern of questioning and response of students. To realize that effect and to plan education in terms of that effect might well be the concern of curriculum makers in literature."

Enough will already have been said to indicate that in spite of its extensiveness and statistical elegance this research has not been productive of much new insight or usable knowledge. Oddly enough the researchers chose to investigate, in the name of cross-national comparison, aspects which are least amenable to objective assessment and left out of consideration aspects such as achievement on national literatures, which surely can validly be assessed. Predictably a number of issues raised in the study have not been conclusively answered (for instance, the root cause of variance among individuals in their ability to read literary works with full comprehension still eludes the researchers), and the conclusions that were arrived at have had to be stated in ambiguous, 'yes-but' terms, hedged in by many caveats. Indeed, the important conclusions are no more perceptive than educated guesses, except that rigorous statistical treatment endows them with some respectability.

Even so, one is gratified that the study has been conducted. It has broken new ground in the intractable field of literature evaluation and developed certain tools and procedures which researchers working on studies of more restricted scope will find useful.

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Manuscripts sent for consideration should be typed double-spaced on one side of the paper only. References in the text to the work of other researchers should be made by giving the name of the researcher, and the year in which his research was published, in round brackets and *not* in the form of serial numbers which connect with the list of references at the end. Typescript in duplicate should be sent to the Editor, and at least one copy retained by the writer for reference.

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Motivating Primary Education A Psychological Strategy for Eliminating Wastage

Prayag Mehta

A study was conducted by the author in 1969 as a prelude to some motivation development experiments, one of which is reported in this paper. The following assumptions relating to the problems of young children in primary schools, particularly in rural areas, have been tested in the experiment: (i) the motivation programme will increase the pupil's desire to 'belong' to his instructional group; (ii) the classroom motivation development curriculum will enhance the pupil's 'interest' in the school, and strengthen his school-going tendency; (iii) it will enhance the pupil's sense of self-worth (self-esteem) leading to greater involvement in school and home activities; (iv) it will accelerate his sense of responsibility.

"The destiny of India is now being shaped in her classrooms. This we believe is no more rhetoric...." Thus opens the report of the Education Commission (1964-66). According to it there were a total number of 5,00,000 educational institutions in the country with over 2 million teachers and 70 million students (in

1966). The number of students will be doubled in the next 15 years and by 1985 will become about 170 million or about equal to the total population of Europe. This, then, is the gigantic problem of educating millions. The number certainly increases the complexity and enormity of the task. But it also provides a rich recourse—a great nation-building human force.

As millions go to schools, millions also go without it. The size of the student population has been exploding over the years. So also the size of the illiterate population. India was more illiterate in 1961 than in 1951 with an addition of about 36 million illiterates. In 1966 there were 20 million more illiterates than in 1961. This has happened despite great expansion in primary education and despite many literacy drives and programmes. The Commission thought that "if the trend is to be reversed a massive unorthodox national effort is necessary" (Education Commission, 1966, p. 423).

The Wastage in Education

The expanding population coupled with the inadequacy of the programmes are perhaps the main reasons for the increasing number of illiterates. There is yet another reason—the wastage at the primary education stage. Many children who pass through it, either do not attain functional literacy or lapse into illiteracy soon afterwards. The extent of wastage and stagnation in our system has been traditionally very large. About half a century ago, the Hartog Committee highlighted this problem. Since then all successive commissions have discussed this. The latest Commission (1964-66) estimated that as against 100 children enrolled in Class I, there were only 20 in Class IV in 1911-12, in 1946-47 this increased to 39, but dropped to 37 in 1965-66. The Commission concluded, "wastage is very large at the lower primary stage—about 50 per cent for boys and 62 per cent for girls. About two-thirds of this wastage occur in Class I. The most important programme to be implemented at the primary stage during the next ten years is to improve the quality of education and to reduce wastage and stagnation to the minimum." (p. 157).

The huge educational wastage amounts to a big loss of nation's scarce monetary resources. Pandit in a recent study (1970) estimated that 2.5 million pupils completed Class VIII education in 1963-64, amounting to a total expenditure of Rs. 181 crores. Out of this 59 crores accounted for dropouts and 20 crores went into financing stagnation. Unesco studied educational wastage during 1967 in 19 countries. India was one of the four countries which showed a wastage range of 56 to 80 per cent. Some other developing Asian, African and American countries do not fair better. Educational wastage seems rampant in developing and struggling nations.

Motivation and Performance

Motivation has always been considered to be a central factor in academic performance. Considerable work has been reported on human motivation and performance in the course of last 25 years. Many years ago Eysenck (1953) found a successful student as persistent, emotionally stable and has level of aspiration not far too removed from reality. An unsuccessful student of similar intelligence lacked persistence, was instable and his level of aspiration unreasonably high or low. Several other studies also found similar results. For instance, Sinha (1966) found that low achievers were high on anxiety, were maladjusted and showed greater social conflicts which again indicated greater susceptibility to anxiety and maladjustment thus causing further under-achievement. Several studies on "study motives" have been reported from USSR. For example, Bozhovich (1962) found the attitude toward study as positive factor in academic work. In another study (1962), he found grades as motive behind the study activity of a school child. Badalev's (1955) work has focused on exactingness toward oneself in school children and its relation to their school performance.

Need for Achievement and Academic Achievement

In our study (Mehta, 1969), which was conducted as a prelude to the motivation development experiments, one of which is being reported in this paper, the significant positive correlations between

concern for achievement and total marks ranged between .27 and .50. The results "highlighted the fact that although *n* Achieve-

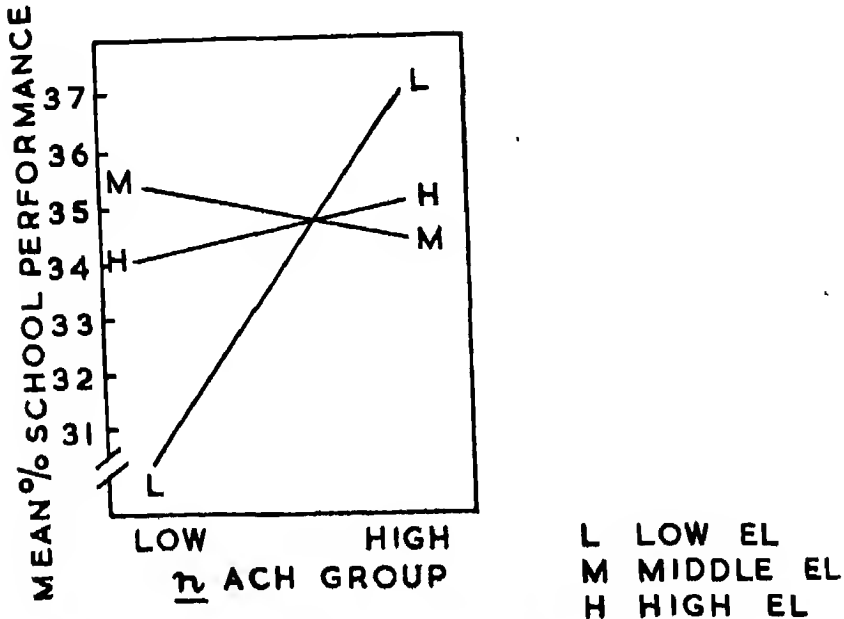


Fig. 1. Academic Performance by *n* Ach for Father's Educational Level

ment (need for Achievement) showed positive relationship with school performance there were other factors which could boost or reduce it" (Mehta, 1969, p. 75). One interesting finding, pertinent to the present discussion was regarding relationship between *n* Achievement and academic performance when pupils' fathers' educational level was controlled. The pupils were classified according to their fathers' educational level into High EL (Fathers' education up to Inter and above), Middle EL (Fathers' with secondary and higher secondary education) and Low EL (Fathers with low or no education) groups. The Low EL Ss showed a marked steeper upward performance for increasing *n* Achievement as per Figure 1 as compared to those in High and Middle EL groups. The results were summarised as follows, "It seemed, therefore, that pupils with

High n Achievement in Low EL group showed the same school performance as the boys with High n Achievement in Middle and High EL groups. This was not so with the boys with Low n Achievement scores. Their peers (from Low EL group) with Low n Achievement scores could not achieve the same level of performance as other boys also with Low n Achievement scores, but in the higher EL groups" (Mehta, 1969, p. 77).

Such results assumed greater significance in view of tremendous wastage and stagnation in our primary and secondary education. Most dropouts and failures come from Low EL group where fathers have no or little education and the educational environment at home is very poor. One of the reasons of dropout and failure could be low n Achievement in pupils, may be also in parents and teachers.

Expectation and Performance

Increasing body of researches show the important role of teachers' expectation in pupil performance. Davis and Dollard (1940) analysed the operation of social class standards in the classroom and found that the lower class child is punished for what he is and that "he is stigmatised by teachers and their favoured students on grounds of "ignorance" of his parents, the dialect which he speaks, the appearance of his clothes and very likely the darkness of his skin" (pp. 284-285). Backer (1952) found that teachers in slum schools use different techniques than teachers in middle class schools. Teachers and administrators expect less from lower class children, and the gap in learning widens through grades. Teachers are influenced by the hygiene and attitudes of children and teachers transfer to "better" schools as soon as they can. Rose (1956) reported that both white and Negroes expect the Negro to fail, a double expectation that keeps the Negro from trying. Deutsch *et al.* (1964) and Gibson (1965) found that teachers' expectations of pupil performance can derive more from the pupils' skin colour, apparent affluence or background information. One of the most important sources of teacher expectation about pupils' intellectual competence comes from standardised tests of intelligence and achievement.

Teachers' Classroom Behaviour and Pupils' Development

Several studies point to the importance of teachers' classroom behaviour in influencing pupils' performance. A classroom teacher is in a position to restrict pupils' talk and thereby stop them from expressing their ideas and feelings. He can also permit them to talk and thereby enable them to fully participate in the classroom activities. Ned A. Flanders has done extensive work on teacher behaviour. He found (1965) in his studies that such teachers who made use of student ideas (as expressed by students in the classroom) promoted positive attitude development in students as well as better student achievement. In some other studies, Morrison (1966) working with 30 Class VI teachers, Lashlee (1965) with 10 Class VIII teachers and 239 pupils and Pankratz (1967) also found results which showed significant influence of teacher behaviour on pupil performance. Teachers who encouraged questions in the classroom allowed pupils to express their difficulties, promoted better student performance as compared to those teachers who discouraged pupils to talk and who tended to justify their own viewpoint and authority.

The variety of available research findings throw considerable light on some important correlates of educational performance. The teacher occupies the central place in classroom teaching-learning process. His interaction with pupils set the pattern of classroom behaviour and produce learning climate which can be stimulating or inhibiting for learning. The curriculum is one of the given in our school situations. There is a pressure to modernise the school curriculum, throughout the world. The Education Commission (1964-66) has recommended several steps to upgrade and reform it at all levels of school education. The National Council of Educational Research and Training, the various State Boards of Secondary Education and the various State Institutes of Education have been engaged in revising curriculum and in producing textbooks and other teaching materials. Curricular changes are essential in modern education. In developing countries, it is all the more essential, in order to take advantage of the advancements in science and technology. However, an increasing number of students from lower middle and lower class are now joining schools. Their home environment may be totally devoid of educational climate. A large

number of such children drop out in Class I itself and many others do so in later primary classes. Some such children manage to continue through primary education—a few reaching the secondary stage. Such pupils may find the curriculum difficult or less attractive and their teachers and principals expecting low of them. The gap in learning (between lower and upper class children) as Mehta (1969) found in his Delhi studies, widens through the successive grades. Such a situation tends to evolve as Deutsch suggested “highly charged negative attitudes toward learning” (1963, p. 178). All these factors working cumulatively and interactively work toward de-motivating the student and in pulling down his performance. The responsibility of this disadvantageousness is the school's, as the lower class child learns his negative attitudes there.

The Human Factor

Besides structural difficulties due to lack of material resources, the human factor emerges as an important determinant of educational wastage, stagnation and under-achievement. The Indian Education Commission (1966) saw an imperative need for raising teacher-morale and for motivating human agencies in education, with a view to get better return on the investment in education. It said, “The fact is that even within the existing resources, however limited they may be, every educational institution can do a great deal more through better planning and harder work to improve the quality of education it provides. In our opinion, therefore, the emphasis in this movement should be, not so much on physical resources, as on motivating the human agencies concerned to make their best efforts in a coordinated manner for the improvement of education, and thereby off-set the shortcomings in the physical resources” (Education Commission, 1966, p. 258).

Making Education Achievement-Oriented

How can we motivate human agencies in education? How to make education more achievement-oriented. One of the important things to know in this connection is how persons with strong moti-

vation to achieve, behave. Series of studies suggest at least the following four important action characteristics in this respect: (1) Persons with high n achievement tend to take calculated and moderate risk. They tend to set realistic goals and aspirations. They do not set either too easy or too difficult goals. (2) Such persons like work situations where they can take personal responsibility for their performance and for the achievement of the goal. (3) They like to know how well they are doing. They are responsive to concrete feedback. They prefer situations where they can get such feedback. (4) They like to search their environment and to make use of available resources in an innovative way. They like to try out new things. Such action qualities are found in entrepreneurs. McClelland (1961) has summarised a variety of studies suggesting that n achievement promotes entrepreneurship which in turn promotes economic growth. Andrews (1966) demonstrated this in the college setting by showing that students with high n achievement tend to score higher on his "Entrepreneurial Acts Index". They participated in greater number of academic and co-curricular activities; they checked more often with their teachers to know how well they were doing and they started more business activities of their own. Some other information in this connection come from researches on child-rearing, socialization and development of n achievement in children. The studies by Rosen and D'Andrade (1959) and others suggest that parents of children who are high on n achievement encourage early independence training, set moderately difficult goals for their children and show warm and encouraging attitudes towards their son's efforts to achieve. There is a significant positive relationship between fathers and their sons' n achievement.

Teachers' n Achievement

Teachers and school principals play an apparently essential part in making education (and schools and classrooms) achievement-oriented. Teachers with high n achievement can be expected to foster n achievement in their pupils. Their moderately high expectation of their pupils can create conducive conditions for them

to try and achieve more. Such teachers may foster positive attitudes toward work and studies.

Increasing Achievement Motivation

Following studies summarised in his *Achieving Society* (1961), McClelland turned his attention toward experimenting with increasing entrepreneurial motivation. He reviewed literature and developed propositions for motive acquisition in adults (McClelland, 1965). His first major experimental motivation development programme was launched in 1964 for businessmen of Kakinada, India. A little before it, Burris (1962) demonstrated that teaching achievement motivation through a counselling programme helps college students improve their academic performance. At about this time, Mehta (1967, 1968) initiated efforts at the National Council of Educational Research and Training to study achievement motive in high school boys and to experiment with motivation development with a view to influence educational process and product. The first experimental motivation development programme was given to Jaipur teachers in October 1965. The experimental design and the training strategy have been detailed and discussed elsewhere (Mehta, 1973).

Experimenting with Primary Teachers and Pupils

The gains from the motivation development programmes with secondary school teachers and administrators were quite instructive. As reported elsewhere (Mehta, 1968, 1969 and 1970) the 'motivated' teachers, particularly pupils, continued to show significant scholastic gains. They also showed greater responsibility and diligence. Following these studies it was decided to conduct a similar experimental study with respect to primary education.

Rural Parents' Interest Aroused

This was rather an unusual event at this village primary school. The total strength of the school was about 250 children, who came

from several neighbouring villages and hutments. The parents generally do not take any interest in school activities. They come to school very seldom—may be on special occasions like the visit of a state minister. Today was, therefore, a rare occasion. A sturdy peasant walked into the school in search of the Headmaster. The visitor wanted to talk about some happy changes in his 12-year-old boy. The father was himself amazed by his son's new found habits.

This was perhaps the first parent to have come to the school. The teacher had received similar reports from other parents as well. His colleagues in the school also got the impression that his pupils in Class VI seemed to have changed. According to them they appeared 'better behaved'. They seemed to have become more earnest in their school activities. They tried to be more "useful" to the school. For example, they took greater interest in and responsibility for cleaning the school. Something seemed to have happened to his pupils after the teacher had started motivation programme in his class.

The primary school at Kadwad, a small village in the Jodhpur district of Rajasthan, was one of the nine such schools selected for an experimental programme designed to develop pupils' motivation to achieve. Of these three were rural schools and the rest located in the Jodhpur city. The rural schools were comparable to each other on academic achievement and on the usual socio-economic variables. Most parents were small peasants. The teachers came from urban background—mostly from Jodhpur city. Three of the urban-based schools were exclusively for girls and the rest for boys. These schools were more or less comparable with each other on academic achievement. They catered to the children of middle and lower middle class and farmers' families. Except one, which was a government-aided private school, all experimentals were government schools. Three schools—a rural (boys), an urban (boys) and an urban (girls)—were selected to work as controls. Of these, the girls' school had to be dropped as it became difficult to collect the needed data from it. Thus, only the two government boys' schools remained as controls for the purpose of comparative analyses.

The Teacher-Motivation Laboratory

Fourteen teachers, two each—a Headmaster and an Assistant Teacher—from five schools and one teacher each from the remaining four schools participated in an eight-day motivation laboratory training,¹ in August 1968. Its design and inputs were similar to the ones described elsewhere (Mehta, 1968). Towards the end of the training programme the teacher participants discussed the classroom motivation-curriculum for their pupils. They suggested several modifications in the curriculum which were being used for secondary school pupils. They made suggestions regarding language, topics for one-act plays, biographies and folk stories. They brought out their practical difficulties and requested the Extension Coordinator (N. S. Shekawat) to take up several time-table adjustments and other arrangements with the Education Department. In some cases, the respective headmasters, who were also participating, readily agreed to make adjustments on their own.

The Classroom Motivation Development Curriculum

Following the experience of the use of classroom motivation development curriculum with secondary school pupils (Mehta, 1968) and the suggestions made by the primary school administrators, teachers and educators, it was decided to revise the various inputs of the curriculum. Attempts were made to make the language easy, examples more understandable, and the concepts, exercises and games more interesting. The revised curriculum was similar in substance to the earlier one, it followed the same principles and sought to meet the same objectives. This has been described elsewhere (Mehta, 1973).

The Implementation

The 'motivated' teachers, in some cases assisted by their headmasters, implemented the classroom motivation development cur-

¹This programme was conducted by H.M. Kanade and M.R. Chilana of the National Council of Educational Research and Training. They were assisted by A.B. Mathur and N.S. Shekawat of the Government Primary Teachers Training School, Jodhpur.

riculum in their respective classes. The Extension Coordinator at the Primary Teacher Training School, Jodhpur, coordinated the programme. The motivation research group at the NCERT prepared the materials² and supplied these to the coordinator who in turn supplied them to the respective teachers. This was done to enable the programme to be given at the same time in all schools. The Motivation Faculty visited the schools at two points during the period of the programme-implementation.

Some Assumptions Tested

The need for motivating human agencies was felt in the context of widespread wastage and stagnation at all stages of education, particularly at the primary school stage. In addition to the question of general theoretical and practical interest as to whether children as young as those studying in Class V would be able to profit by such a programme, the following specific assumptions relating to the problems of young children in primary schools, particularly in rural areas, were tested in the experiment:

1. The motivation programme will increase the pupils' desire to 'belong' to his instructional group.
2. The classroom motivation development curriculum will enhance pupils' 'interest' in the school, and strengthen their school-going tendency.
3. It will enhance the pupil's sense of independence, his sense of self-worth (self-esteem) leading to greater involvement in school and home activities.
4. It will accelerate his sense of responsibility.

It was argued that the teachers' integrative classroom behaviour will tend to draw the pupils more and more out; making them more open; the various exercises (in the programme) will increase their involvement in the classroom activities. All this will help the child to become more interested in the school. This will also increase his school-going tendency. This will increase his 'liking' for his teacher as well as for his class group as a whole. The achievement

²H.M. Kanade actively assisted the author in preparing the classroom materials.

motivation and goal-setting exercises will make 'himself' as the central figure of pupil's attention. This will help him not only to increase his motivation to achieve, but also make him feel important in his own eyes, thus increasing his self-esteem. All this will start a chain of changes in his personal habits.

Measures of Change

The programme involved a total of 220 pupils spread over nine experimental schools. There were 36 pupils in the two control schools. Before the trained teachers started 'teaching' the motivation curriculum, all pupils were administered a test for achievement motivation (the TAT type pictures), semi-standardised achievement tests in arithmetic, Hindi, social studies and general science. The achievement tests were standardised at the Government Primary Teacher Training Institute. These tests were repeated at the end of the classroom programme.

At the end of the programmes, data on classroom trust, defence and achievement anxiety were obtained. The Pre-Adolescent Classroom Trust Scale (PACTS) and the Pre-Adolescent Dependency Scale (PADS) have been prepared by Parcek and Rao (1971) for use with children of 9 years and above. The PADS has shown varying reliability with maximum of .840 (on parallel forms). The PACTS showed a split-half reliability of .814 and a test reliability up to .77. The PADS contains ten items such as: "I blindly follow everything the teacher talks" (always or mostly; sometimes; rarely or never). "I have got full self-confidence", "I am easily persuaded by others". The PACTS contains eight classroom situations each with four choices.

The Achievement Values and Anxiety Inventory (AVAI) has been standardised to yield scores on achievement anxiety (Mehta, 1966, 1972). It has been used with other groups of school children (Chowdhary, 1972; Gokulnathan, 1972; Pandrepande, 1973).

In addition to these tests, the teachers were asked to maintain a running diary of their observations of pupils in their class. They recorded whatever drew their attention in their children's behaviour as well as other interesting events in their classroom during the implementation of the programme.

RESULTS

The Psychological Gains

Initially, the experimental and control children, as seen in Table 1, showed the same level of need for achievement. As was expected, the experimentals showed a very significantly greater acquisition of the new language in their thought processes as revealed by their stories. The controls showed no such change. Consequently, the experimental children showed a much stronger achievement motivation at the end of the programme.

TABLE 1
Gain in Achievement Motivation

	<i>N</i>	<i>Test 1 Mean</i>	<i>Test 2 Mean</i>	<i>Gain</i>
Experimental	.61	5.02	18.38	13.35
Control	.13	4.90	5.55	0.65
P		NS	.001	.0001

Classroom Trust and Dependence

The experimentals indicated significantly greater trust in their teachers and in other classroom situations, than the controls, as seen in Table 2 (p. 16). The two groups did not differ in scores on the dependence scale. The significantly higher trust scores indicated a better rapport between children and teachers in the experimental classrooms. It also indicated that the experimentals were likely to participate more (than the controls) in classroom activities; they might take greater risk in asking questions and in answering teachers' questions; in trying out new ideas; they might anticipate (more than the controls) that their teachers would appreciate their view-point and that they might 'fear' their teachers 'less' (than the controls).

The Teacher Reports

As mentioned earlier, all concerned teachers (in experimental as well as in control schools) maintained records of any changes they might have observed in their children. It was interesting that the control teachers had nothing to report at the end of the four-month period. On the other hand, all, but one, experimental schools reported some change or the other in their children. The concerned teachers in all the three rural schools reported several changes in their children. They thought that the children were more punctual, more responsible, and more hard working. One of them thought that his children had improved in personal habits like cleanliness and truthfulness and that some children who used to smoke 'bidies', gave it up. The teachers in the city schools also thought that their children had become more responsible and hard working. The girls' school teachers were more emphatic in such reports. Another interesting thing was that the experimental teachers reported that their colleagues, who were not involved in the motivation programme, had also observed several changes in the experimental children. Such teachers frequently talked to the motivation teachers that 'something' was happening to their children. As mentioned in the beginning, some teachers received reports of improvement in children from some parents. That rural parents perceived such changes in their children was an interesting indication.

The Halo Effect

Did the programme really produce so many changes in children? It was difficult to answer this question in absence of adequate data. There were several inputs in the programme which aimed at improving sense of responsibility, use of time, goal-setting behaviour, and work habits. The teachers were motivated and trained to produce integrative classroom behaviour with a view to create supportive and mutually respectful climate. The entire nature of the motivation curriculum tended to involve the children more and more. The programme was involving not only for the children, but for the teachers as well. They were teaching and doing something

new. They were themselves 'motivated'. They might have, therefore, perceived more changes in their children than what actually occurred. May be they reported that their children had improved in certain ways because they (teachers) *were expected* by the programme directors to say so. Some of the teachers' perceptions were therefore an artifact of the design of the experiment. It was just a halo effect.

This halo effect at least was a significant gain of the programme. The difference in the teachers' tendency to expect changes and improved behaviour in children was itself very important. Then, the difference in their perception of improvement was also a gain. It seems, the programme produced a difference in the mind of the experimental teachers and changed their image of their pupils. They started making 'positive' predictions about their pupils. Teachers' prophécy about their pupils tend to be self-fulfilling. It influences his (teacher's) behaviour toward the child which in turn influences the child's development and his scholastic performance. When teachers expect their pupils to be responsible, a machanism is set into motion which helps them to learn to behave with responsibility. Such teachers increase trust in pupils and assign greater responsibility to them. This in turn encourages children and increases mutual trust. This is perhaps reflected in the higher trust score of the experimental children, as seen in Table 2. It is additionally interesting to note that the teachers in general (who were not involved in the programme) started perceiving improvement in the experimental pupils. This was indicative of enhanced school expectation of and increased teacher attention to them.

TABLE 2
Trust and Dependency Scores of Experimental and Control Groups

	TRUST		DEPENDENCY	
	N	Mean	N	Mean
Experimental Group	61	23.97	61	10.08
Control Group	13	20.61	19	9.74
	t	3.20**		0.60

**Significant at .01 level

Thus the experimental children obtained several psychological gains. Their achievement motivation was strengthened considerably. Their behaviour became more responsible. They started putting in greater effort. Their parents perhaps thought better of them now. Their self-image and self-esteem implicitly improved. The improved internal resources and the teachers' enhanced expectation and attention were likely to result in improved scholastic performance.

The Scholastic Gains

All the necessary data could not be collected from all pupils in all schools. Sometimes some pupils were absent, sometimes some other pupils were absent. There was, therefore, considerable attrition in the original sample. Then, the number in control schools became too small as compared to that in the experimental schools. In order to avoid bias due to selective availability, it was decided to draw a small random sample of about 50 children from the various experimental classrooms and combine them for processing. Similarly, a small sample was drawn from the control classes. The percentage of marks obtained at the achievement tests are shown in Table 3.

TABLE 3
Mean Per Cent Marks Obtained by the Experimental and Control Groups

	HINDI				MATHS.			
	Pre-test		t		Pre-test		t	
	N	Mean	Post-test Mean		N	Mean	Post-test Mean	
Experimental Group	50	67.41	71.51	5.00***	50	51.30	60.79	1.89*
Control Group	25	76.00	68.61	1.44	25	44.17	40.00	0.89
	t	3.50**	3.68**			1.54	2.88**	

	SOCIAL SCIENCES				SCIENCE			
	Pre-test		t		Pre-test		t	
	N	Mean	Post-test Mean		N	Mean	Post-test Mean	
Experimental Group	49	63.80	64.88	NS	46	68.21	65.86	0.85
Control Group	25	55.11	56.81	NS	25	51.52	55.11	0.88
	t	6.21***	2.14*			4.06***	2.58**	

*Significant at .05 level
**Significant at .01 level
***Significant at .001 level

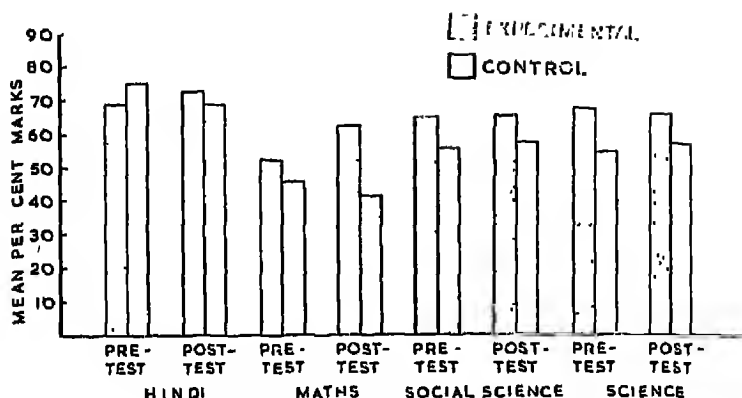


Fig. 2. Mean Per Cent Marks Obtained by the Experimental and Control Groups

Initially, children in the control group fared significantly better in Hindi than those in the experimental group ($P < .01$). After the four-month motivation development curriculum, this was reversed. The experimentals not only very significantly ($P < .001$) improved upon their own previous performance, as seen in Figure 2, but scored more than the controls ($P < .01$). On the other hand, the controls scored slightly less at the post-test in Hindi than that at the pre-test. Almost the same pattern was revealed in mathematics, as seen in Figure 2. The experimentals performed better in mathematics, than the controls at the initial stage. This difference was widened at the post-test where the experimentals significantly increased their score ($P < .05$). The performance in social science did not register any change. The experimentals did show better performance than the controls in general science, but there was no improvement in the position at the end of the experimental programme. The over-all results were also not clear as seen in Table 4.

TABLE 4
Gain in Total Marks Obtained by the Experimental and Control Groups

	N	Pre-test Mean	Post-test Mean	Gain	t
Experimental Group	50	245.58	270.72	25.14	1.95*
Control Group	24	210.25	220.96	10.71	1.22
	t	2.19**	3.48***	1.82*	

* $P < .10$; ** $P < .05$; *** $P < .01$

Education can be Changed

The results of the various experiments can be summarised as follows: (1) The psychological training helped the teacher strengthen his achievement motivation. He was also helped in improving his *image* of pupils. He probably started expecting 'better' performance of them. However, the psychological gains, particularly the gain in achievement motivation was found to show a tapering effect two years after the original training. (2) The children gained in achievement motivation and in sense of responsibility, team spirit, tendency to work hard and probably in punctuality. Such gains, specifically achievement motivation, showed the same tapering effect some two years after the original training. (3) The classroom goal-setting exercises along were not found to be effective in strengthening achievement motivation. (4) The scholastic results revealed unclear trends immediately after the programme. The bright under-achieving experimentals seemed to have done slightly better. How do we understand the gain of psychological training of teachers and their pupils? As mentioned earlier, the programme seemed to have made a difference in the mind of the teacher. The various training inputs seemed to have changed teacher's self-image, his image of pupils and probably his approach to work. His desire to succeed and his hope of success were also strengthened. The same changes seemed to have appeared in pupils. He thought better of himself, his teacher (the 'motivation' teacher in particular), his classroom group and his studies. He strengthened his desire to succeed and increased his hope of success.

The first activity in the sequence of the programme was the teachers' motivation development laboratory. The very basis of such a programme is the belief that it is possible to develop teachers' motivation and change them for the better. Besides the various training inputs, the training directors and the consultants expect the participants not only to change, but also to behave in certain different ways in their classrooms. A feeling is developed that they are capable of doing better and that they can do it. Thus, not only their desire to compete for success is heightened, but they are confronted with a challenging task, i.e., the implementation of the

classroom curriculum. The dynamics generated by the programme may be depicted schematically as in Figure 3 (p. 20).

The classroom motivation development curriculum promotes mutually satisfying interaction between the teacher and his pupils. The teacher now expects better of their pupils. The various inputs strengthen the pupils' achievement motivation. His self-image also improves. The teacher delegates considerable freedom and responsibility to the pupils. He tends more now to accept student feelings and ideas. The pupils carry out several exercises on their own. They think about their goals, success and failures. These activities generate new power and social relationships in the class group. As seen in Figure 3, the new pattern of interaction during the motivation curriculum tends to satisfy two psychological needs of both, the teacher and his pupils. They come closer to each other in a friendly relationship. This gratifies their need for affiliation. The teacher's indirect influence over pupils increases which in turn increases his indirect control over them. This is different from the usual assertion of direct power in the classroom. Such indirect control satisfies another need—the need for power. The greater participation in classroom decision-making as well as several self-study and group exercises provide gratification of the pupils' need for power. These social relationships give a new structure to the classroom group. It becomes more cohesive. The classroom trust in-

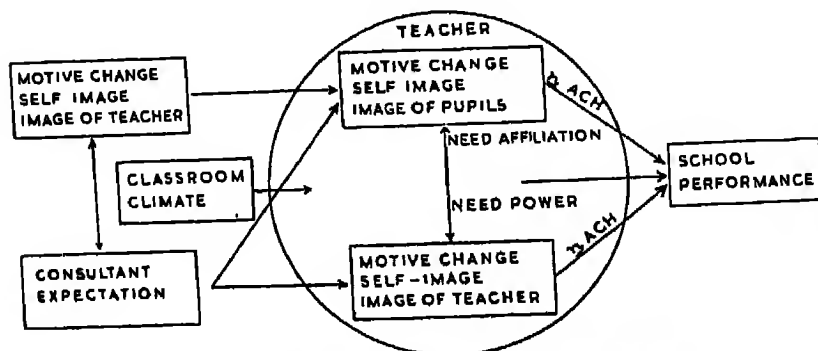


Fig. 3. *A Model for Motivating Human Agencies in Education*

creases. The enhanced openness promotes further interaction and involvement. The increased social acceptance promotes positive self-image.

Academic Performance

In the motivation programmes there was no input directly related to performance. There was no attempt to provide any help either to the teacher or to the pupils for improvement in performance. The Teacher's desire to do things in a better way was heightened. It was assumed that he would actually start trying to do it better. The improvement in self-image would enable the teacher to try for better standards. The change in his image of his pupils would lead him to *expect* more from his pupils, pay more attention to them, give them more help, which in turn would help the pupils to do better. Similarly, the strengthening of pupils' achievement motivation and self-image would lead him to try for better performance. These may lead to improvement in his study behaviour. The interaction of these two, the teacher's desire to do better and his enhanced expectation of pupils on one hand, and the pupils' desire to do better and their self-expectation is likely to improve school performance.

The model did not provide for certain that the 'motivation' teachers also teach the school subjects in which the pupils were later tested. It might have been so in the primary school programme where one teacher teaches several subjects in a class. One of the assumptions could have been that the 'motivation' teacher would do a better job of teaching (other things being equal) thus promoting academic performance in his pupils. This was not checked in the present research. However, in the classroom goal-setting programme, the subject teachers were involved in setting the classroom tests and in giving comments and the feedback. The results, however, did not show any appreciable improvement in academic performance of such pupils. On the other hand, the pupils in the classroom motivation curriculum tended to show significantly better school performance. It seems, therefore, that whatever improvement occurred, could have been obtained by dint of pupils' own effort. As mentioned above, and seen in Figure 3, both, the programme direc-

tors and the classroom motivation teachers, *expected* better performance of the pupils. Such expectation, and more certainly the teachers' new images, the new social relationship and the changed classroom climate might have provided the much-needed spark to the pupils' academic efforts.

Interest in School Works

Academic achievement continues to be the most important objective of education. However, there are several objectives in the effective domain which are also important. Scientific temper, tolerance of other faiths, team spirit, sense of responsibility, confidence in oneself and in the nation's future are some such qualities. The Education Commission has talked of such qualities and about the reshaping of education as an instrument of national development (1966, Chapter I). One of the earliest things that need to be done is to make education, particularly the primary school, a little more attractive. The Commission has suggested a number of structural and curricular steps in this direction. They have also discussed the need for motivating human agencies in this regard. Strengthening of motivation to achieve, hope of success and the desired classroom climate may initiate a chain of desired behaviours in the motivated teachers and pupils. The motivated teacher is likely to act upon the school environment and make it more rewarding (to him) and interesting for the pupils. The equally motivated pupil is likely to actively contribute to this process. The significant increase in children's punctuality perhaps indicates their increased interest in school activities. Such an enhanced interest can work as a strong antidote to wastage and stagnation.

The Administrator's Role

Some school administrators, particularly some principals, have participated in motivation development laboratories. There are reports^{*} that such school principals have introduced a number of

^{*}Several members of Biradari, a voluntary association of headmasters in the Baroda, Kaira districts of Gujarat have made such attempts. They have been doing this work in collaboration with M.B. College of Education, Sardar Patel University, Anand, and Centre for Advance Study in Education, Baroda University.

activities in their school. In Baroda University, D. B. Desai and M. B. Buch have done considerable work in this connection. They have also tried to motivate their teachers, thereby producing a multiplication effect. Such attempts await documentation. Systematic attempts are needed to motivate the entire school system through the top management. Such a possibility is visualised in the model shown in Figure 3. As interaction between motivated teacher with positive image of self as well as of pupils with similarly helped children generates a new sense of purpose. His interaction with similarly motivated administrator is likely to yield productive results.

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The Relationship between Scholastic Achievement and the Activities of Secondary School Pupils: An Exploratory Study

H. S. Srivastava

This study endeavours to verify some of the popular beliefs about the relationship between the scholastic achievement of secondary school pupils and the activities they pursue.

Many teachers apparently hold certain popular beliefs about the factors related to the level of scholastic achievement among pupils. That these need to be verified, before being taken as established truths or guiding principles for educational decisions, is the chief motivation behind the study.

The common beliefs put to test in the investigation were briefly as follows:

- (1) The greater the number of activities in which pupils participate, the lower is the level of their scholastic achievement.
- (2) High scholastic achievement and the variety of extra-curricular activities pursued by the pupils, do not go together.
- (3) Brighter pupils are desirous of undertaking more activities than the less bright.
- (4) Instability in the grades of a pupil from class to class, is related to similar instability in the activities he pursues.

The basic assumption of the study was that curricular and extra-curricular activities pursued by individual pupils are related

to the different facts of their growth. The investigation, however, focusses its attention on only one of these aspects, the scholastic achievement.

Towards verifying the soundness of the above commonly held notions, the investigation employed data on academic achievement of secondary school pupils and their expressed interests in literary, artistic or recreational activities. The method used for accomplishing this end was to explore the relation between interests and achievement of the students included in the study.

PURPOSE OF THE STUDY

The popular beliefs suggested above have certain educational implications which indeed form the purposes of the study. These purposes are to explore:

- (i) the differences in the amount of activity pursued by the students of different achievement levels;
- (ii) the different types of activity that pupils of different achievement levels undertake;
- (iii) the nature of activities which the pupils of different scholastic levels desire to do;
- (iv) the types of activities which the pupils of different scholastic levels like best; and
- (v) the relationship between the nature of activities habitually pursued by the pupils and the variability in their scores from class to class.

Though the study was undertaken with the above purposes in view, the findings were expected to produce relationships rather than any statements about levels or norms, because it was not a normative study.

PREPARATION OF THE CHECK-LIST

The determination of pupils' expressed interests was attempted through a check-list. The procedure of constructing it has been discussed below.

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(4) The Selection of Activities

The 80 activities included in the check-list were culled out of an original list of over 300 activities displaying adolescent interest. The sources from which the activities were drawn into this first list were:

- (1) Library readings on extra-curricular activities and adolescent interests.
- (2) Interviews with 11 higher secondary school teachers from four schools.
- (3) Interviews with 17 higher secondary students.

The interviews being limited in purpose, were brief both in terms of content and time-span. Both students and teachers were normally asked five questions each, unless the interview situation demanded one or two subsidiary questions to clarify any vague responses from the subjects.

Teachers' Interview Schedule

The questions asked of the teachers were:

- (1) What are the common activities, in which the students of secondary classes normally participate?
- (2) What are the activities in which the bright students generally participate?
- (3) What are the activities in which the dull students generally participate?
- (4) What outside class activities, according to you, favourably influence the educational growth of pupils?
- (5) What activities, in your opinion, hamper or retard the educational growth of pupils?

Students' Interview Schedule

The questions asked of the students were:

- (1) What activities do you like doing best during your leisure time?

(2) Name some of the activities which you would like to engage yourself in, if you had opportunity.

(3) What leisure-time activities, done by your classmates, are beneficial to their studies?

(4) What leisure-time activities of students are essentially harmful for their studies?

(5) In what activities do the bright pupils of your class, normally, spend their leisure?

The list of activities compiled from the three sources avoided duplications. The activities were also labelled to signify specific categories in terms of the following classifications attempted.

I. Classification: Content of Activities

The first and probably the most important of the four classifications was as follows:

(1) *Literary activities* as those of academic nature, involving the exercise of mental powers and having a direct or indirect relationship to the curricular or co-curricular activities or requiring their practical application to life problems.

(2) *Artistic activities* as those related to fine arts (music, painting, poetry, nature) whose pursuit requires a well developed aesthetic sense, in appreciation or skill in the production of a piece of art.

(3) *Visits* include activities that necessarily involve moving out of the home or the school towards satisfying an individual or groups interest.

(4) *Recreational activities* as those which in common parlance are signified and categorised as leisuretime activities. They cover indoor and outdoor games besides other modern means of recreation.

(5) *Miscellaneous activities* as those which do not specifically belong to any of the above categories. Nevertheless, they do attract consistently high participation from the students.

II. Classification: Group or individual Activities

(1) *Individual activities* as those in which pupils participate individually without the necessity of partners or mates.

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(2) *Group activities* as those in which an individual by himself cannot singly participate and companions are necessary.

III. Classification: Active or Passive Activities

(1) Active activities as those involving gross bodily movement for participation.

(2) Passive activities as those not necessitating gross bodily movement, though not inhibiting the exercise of mental powers.

IV. Classification: Indoor or Outdoor Activities

(1) *Indoor activities* as those undertaken under the roof of the home or the school.

(2) *Outdoor activities* as those undertaken outside the home or not under the home or school roof.

Activities from all the four categories were selected for the check-list to conform to the pattern shown in Chart I.

CHART I

Check-List of Activity Specifications

(A) CLASSIFICATIONS OF ACTIVITIES

(A numerical distribution)

I		II		III		IV	
Type of Activity	No.	Individual	Group	Active	Passive	Indoor	Out-door
Literary	16	8	8	8	8	8	8
Artistic	16	8	8	8	8	8	8
Visits	16	8	8	8	8	8	8
Recreational	16	8	8	8	8	8	8
Miscellaneous	16	8	8	8	8	8	8
		40	40	40	40	40	40
Total ,	80	80		80		80	

(B) CROSSSECTIONAL DISTRIBUTION OF ACTIVITIES AMONG THE FOUR CLASSIFICATIONS

	Individual	Group	Total		Individual	Group	Total
Passive	20	20	40	Outdoor	20	20	40
Active	20	20	40	Indoor	20	20	40
Total	40	40	80	Total	40	40	80

	Active	Passive	Total
Outdoor	20	20	40
Indoor	20	20	40
Total	40	40	80

(C) ACTIVITY TRIADS WITHIN THE FIRST CLASSIFICATION

Activity Triads	Literary	Artistic	Visits	Recreational	Miscellaneous
Individual active outdoor	2	2	2	2	2
" " Indoor	2	2	2	2	2
" passive Outdoor	2	2	2	2	2
" " Indoor	2	2	2	2	2
Group active Outdoor	2	2	2	2	2
" " Indoor	2	2	2	2	2
" passive Outdoor	2	2	2	2	2
" " Indoor	2	2	2	2	2
Total	16	16	16	16	16

SCHOLASTIC ACHIEVEMENT AND THE ACTIVITIES OF SECONDARY SCHOOL PUPILS

Each activity, thus, can be given four names, one in regard to each of the four classifications. *For the purposes of the present study, however, data concerning literary, artistic and the recreational activities only have been analysed and will be reported.*

(ii) Organisation of Activities

The 80 activities of the check-list were divided into 20 sections of four each, with care that no two activities of the same specifications are included in one section. The section-wise organisation of activities is depicted through Chart II.

In each section, there were four activities, two were individual and two group activities; two active and two passive activities; two indoor and two outdoor activities and four of the five (literary, artistic, visits, recreational, and miscellaneous) activities.

CHART II

Pattern of the Content of Each of the Twenty Sections

Classification	I	II	III	IV
Type of Activity	Literary, Artistic, Visits, Recreational, Miscellaneous	Individual Group	Active Passive	Indoor Outdoor
Number of Activities Included in Each Section	Four out of five activities without repetition	2 2	2 2	2
Number of Activities in Each Section	4	4	4	4

Though quite easy to state, this was extremely difficult to accomplish. It involved adjustment and re-adjustment, arrangement and re-arrangement, grouping and re-grouping.

To improve the instrument and to ensure its validity, the check-list was reviewed by five teachers and their criticism in respect of

activity specifications, was discussed at a common meeting. Even after many revisions, incorporating suggestions from different quarters, the framer is still aware of flaws in the instrument that escaped correction. The reliability of the items included in the check-list could not be investigated, because of lack of time and certain administrative difficulties.

(iii) Finalisation for Administration

In the check-list each activity was preceded by four letters, H, N, B and L. The students were required to encircle one or more of these letters according to their choice, on the basis of the directions given. The symbols have been explained as below:

- (1) "H" interpreted as "I habitually do" stood for activities done by the students almost every day.
- (2) "N" interpreted as "I have never tried" designated those activities, which the students might never have had an opportunity of participating in.
- (3) "B" interpreted as "I like best out of four" indicated that one activity out of a section containing four, which the pupil liked best.
- (4) "L" defined as "I would like to do if there were opportunity", designated those activities which the student might not so far have tried, but ones that he would like to do if he had opportunity.

The check-list, as it emerged out of the aforesaid treatment, is given below. The specifications of classifications are given in the appendix.

CHECK-LIST

I

- | | |
|---------|--|
| H-N-B-L | 1. Writing a description of natural beauty, by a river side. |
| H-N-B-L | 2. Watching a group-dance performance. |
| H-N-B-L | 3. Making notes on the exhibits in a museum. |
| H-N-B-L | 4. Watching a horse-race with friends. |

II

- | | |
|---------|--|
| H-N-B-L | 5. Participating in a mock parliament session. |
| H-N-B-L | 6. Observing paintings in an art gallery. |
| H-N-B-L | 7. Watching the working of a sugar mill. |
| H-N-B-L | 8. Visiting a zoo with classmates. |

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III

- | | |
|---------|---|
| H-N-B-L | 9. Preparing mathematical quizzes. |
| H-N-B-L | 10. Working in the home garden. |
| H-N-B-L | 11. Working in the science club workshop. |
| H-N-B-L | 12. Drawing sketches of the sun-rise and the sun-set with classmates. |

IV

- | | |
|---------|--|
| H-N-B-L | 13. Watching a rainbow from a hill top. |
| H-N-B-L | 14. Playing cards. |
| H-N-B-L | 15. Listening to the voice of different birds in a garden. |
| H-N-B-L | 16. Organising a book stall in an exhibition. |

V

- | | |
|---------|---|
| H-N-B-L | 17. Organising the school stall in the inter-school art exhibition. |
| H-N-B-L | 18. Playing with self-made scientific toys. |
| H-N-B-L | 19. Preparing artistic designs for the school flower beds. |
| H-N-B-L | 20. Watching a circus show with family members. |

VI

- | | |
|---------|--|
| H-N-B-L | 21. Observing the day-by-day growth of a plant. |
| H-N-B-L | 22. Observing the working by a new machine in a show-room. |
| H-N-B-L | 23. Playing a match on the school grounds. |
| H-N-B-L | 24. Playing a role in the school drama. |

VII

- | | |
|---------|---|
| H-N-B-L | 25. Listening to the lectures of a philosopher. |
| H-N-B-L | 26. Going to a place of worship, to watch a religious ceremony. |
| H-N-B-L | 27. Polishing domestic furniture. |
| H-N-B-L | 28. Canvassing in a school election. |

VIII

- | | |
|---------|--|
| H-N-B-L | 29. Observing vehicular traffic on the road. |
| H-N-B-L | 30. Going on a school trip to discover beauty spots in nearby gardens. |
| H-N-B-L | 31. Participating in group exercises in the school gymnasium. |
| H-N-B-L | 32. Solving cross-word puzzles. |

IX

- | | |
|---------|---|
| H-N-B-L | 33. Watching an eclipse with the science teacher. |
| H-N-B-L | 34. Visiting shops selling curios. |
| H-N-B-L | 35. Watching caricatures made by classmates. |
| H-N-B-L | 36. Knitting garments or embroidery. |

X

- | | |
|---------|---|
| H-N-B-L | 37. Collecting information about cricket matches from newspapers. |
|---------|---|

- | | |
|---------|---|
| H-N-B-L | 38. Participating in an inter-school music competition. |
| H-N-B-L | 39. Going out to help parents in their professional work. |
| H-N-B-L | 40. Observing artistic designs in natural objects. |

XI

- | | |
|---------|---|
| H-N-B-L | 41. Listening to a poetic concert. |
| H-N-B-L | 42. Watching the cricket match being played. |
| H-N-B-L | 43. Visiting libraries to read rare books. |
| H-N-B-L | 44. Going to visit places related to one's past life. |

XII

- | | |
|---------|--|
| H-N-B-L | 45. Studying paintings in an art album. |
| H-N-B-L | 46. Watching visitors to an exhibition. |
| H-N-B-L | 47. Learning hymns for religious ceremonies. |
| H-N-B-L | 48. Going to an historical place with schoolmates. |

XIII

- | | |
|---------|--|
| H-N-B-L | 49. Watching the group-singing of the school song in a march-past. |
| H-N-B-L | 50. Flying kites. |
| H-N-B-L | 51. Writing to a friend about a picnic he could not attend. |
| H-N-B-L | 52. Participating in the silent mass prayer of the school. |

XIV

- | | |
|---------|--|
| H-N-B-L | 53. Watching stalls in an exhibition. |
| H-N-B-L | 54. Playing chess. |
| H-N-B-L | 55. Collecting weather data for the general science diary. |
| H-N-B-L | 56. Reading books on cooking. |

XV

- | | |
|---------|--|
| H-N-B-L | 57. Playing with a mechano. |
| H-N-B-L | 58. Watching a scout camp-fire. |
| H-N-B-L | 59. Going to watch magic show. |
| H-N-B-L | 60. Watching trees and plants after rains. |

XVI

- | | |
|---------|---|
| H-N-B-L | 61. Singing in a music concert. |
| H-N-B-L | 62. Playing badminton. |
| H-N-B-L | 63. Visiting a school on its annual function day. |
| H-N-B-L | 64. Reading about nature while sitting in a jungle. |

XVII

- | | |
|---------|--|
| H-N-B-L | 65. Observing an English lesson on the television. |
| H-N-B-L | 66. Collecting specimens of rocks for the school museum. |
| H-N-B-L | 67. Practising on musical instruments. |
| H-N-B-L | 68. Going to listen to a religious discourse. |

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XVIII

- | | |
|---------|---|
| H-N-B-L | 69. Watching nature and natural phenomenon. |
| H-N-B-L | 70. Working in the school garden with other classmates. |
| H-N-B-L | 71. Reading biographies and auto-biographies. |
| H-N-B-L | 72. Helping family members in domestic work. |

XIX

- | | |
|---------|---|
| H-N-B-L | 73. Teaching youngsters. |
| H-N-B-L | 74. Watching a renowned classical drama on an open-air stage. |
| H-N-B-L | 75. Going out fishing on a holiday. |
| H-N-B-L | 76. Seeing a movie. |

XX

- | | |
|---------|--|
| H-N-B-L | 77. Arranging flower pots with class-fellows in the school compound. |
| H-N-B-L | 78. Going with the school team to participate in an athletic meet. |
| H-N-B-L | 79. Observing seasonal changes in the school garden. |
| H-N-B-L | 80. Reading novels for pleasure. |

COLLECTION OF DATA

The data for the study were collected in two parts and also in two instalments.

(i) *Examination Scores*

The study necessitated the collection of examination scores for Classes VII, VIII and IX of those pupils who had appeared at the Class IX annual examination, 1968. The need of marks for three consecutive years posed the following problems and greatly slashed the sample. These problems briefly were:

- (1) Migration at the end of Class VIII as a very common phenomenon.
- (2) Transfer from one section of the school into another section, in the next higher class and the absence of adequate records to trace back the students.
- (3) Absence of scholars' registration numbers against the names of the students.
- (4) Absence of orderly writing (say in an alphabetical order) of pupils' names in the result registers.

The examination scores in respect of pupils were collected for each class in the following subjects:

IX	English	Maths. or Ele. Maths.	Physics or Economics or Civics	Chemistry or History
VIII	English	Maths.	Social Studies	General Science
VII	English	Maths.	Social Studies	General Science

In the case of a student, who had failed in earlier classes (VIII or VII), the results were used for only those years in which he had been promoted to the next class. The Class IX result, however, was taken as such whether a student had passed or failed.

The method of keeping the examination results too was not uniform. One school kept the final scores in terms of percentages. The other two recorded marks out of 150 for all subjects and classes except English in Class IX, in which marks were recorded out of a maximum of 200. The scores were, therefore, converted to the common denomination of 150 maximum marks.

Year totals, the grand mean of the three-year marks and the sum of the squares of the deviations of the grand mean from the year totals were calculated, as symbols of the level of, and variability in the scholastic achievement of the individual pupils.

(iii) Pupils' Expressed Interests

The data on pupils' expressed interests were obtained through responses on the check-list. The check-list was tried out on 28 students before actual administration on the selected sample.

Incorporating the experiences of the try-out in the plans of administration, the following steps were found necessary as a part of the preparation:

- (1) Three difficult words (caricatures, quizzes and art gallery) used in the wording of the check-list activities were explained in advance.
- (2) The instructions for marking the check-list were written on the black-board in both Hindi and English.
- (3) Some of the mistakes pupils could commit were also explained and written on the black-board.

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The final administration, however, presented problems of large-scale drop-outs and migration in the case of failures and the scattering of the students into different sections in Class X, in the case of those who had passed.

A two-minute oral introduction by the investigator created rapport. During this time the study was introduced to the students, and they were also told that there were no right or wrong answers, no time-limit for answering and no marks to be given on their responses.

Despite instructions to the effect, some of the students marked more than one "B" in one section while they did not mark any in some others. The sample being already small, the scripts were not rejected, but referred to the students once again for marking necessary corrections.

To facilitate any further studies, with the unused data of this investigation, the tabulation of results was done in a very elaborate manner, though, only a few aspects of the data were studied at this time. The plan of tabulation is given in Chart III.

INDEX TO SYMBOLS USED IN THE PLAN OF TABULATION

(H)	=	I habitually do
(N)	=	I have never tried
(B)	=	I like best out of four
(L)	=	I would like to do if there is opportunity
I. A. O.	=	Individual, active, outdoor
I. A. I.	=	Individual, active, indoor
I. P. O.	=	Individual, passive, outdoor
G. A. O.	=	Group, active, outdoor
G. A. I.	=	Group, active, indoor
G. P. O.	=	Group, passive, outdoor
G. P. I.	=	Group, passive, indoor
L	=	Literary activities
A	=	Artistic activities
V	=	Visits
R	=	Recreational activities
M	=	Miscellaneous activities

The Plan of Tabulation

[illegible]

TABLE 1

Mean and Standard Deviation of Check-List Responses of Pupils' Expressed Interests as Distributed between the Activities of the First Classification

S. No.	TYPE OF ACTIVITY	HABITUALLY DONE ACTIVITIES		NEVER TRIED ACTIVITIES		BEST LIKED ACTIVITIES		LIKE TO DO ACTIVITIES	
		X	SD	X	SD	X	SD	X	SD
1.	Literary Activities	3.3	2.2	6.2	2.2	3.0	2.1	5.5	2.6
2.	Artistic Activities	2.9	1.9	6.9	4.1	3.3	2.0	6.6	3.1
3.	Visits	2.6	2.0	4.5	2.4	4.0	2.1	5.3	2.8
4.	Recreational Activities	4.8	2.8	4.8	2.2	5.9	2.2	3.6	3.4
5.	Miscellaneous Activities	2.4	1.5	5.3	2.4	2.7	2.4	4.6	2.4

V. STATISTICAL ANALYSIS OF DATA

The data were subjected to two statistical treatments.

(i) *Mean and Standard Deviation*

In the first place, mean and standard deviation were calculated for the number of check-list responses for each of the types of activities of the first classification. The number of "never tried activities", for example, was counted for each type of activity and it is these numbers whose mean was computed. Thus a high mean implies a higher occurrence of the activities of a certain type among the responses of a particular pupil. The results have been given in Table 1 (p. 39).

(ii) *Coefficients of Correlation*

The next part of the statistical analysis consisted of the calculation of product moment coefficients of correlation between some selected variables in the data. These are given below.

(A) VARIABILITY AND HABITUALLY DONE ACTIVITIES

<i>Elements of relationship</i>	<i>r</i>
Variability and habitually done literary activities	-.01
Variability and habitually done artistic activities	-.13
Variability and habitually done recreational activities	-.02

(B) SCHOLASTIC ACHIEVEMENT AND HABITUALLY DONE ACTIVITIES

<i>Elements of relationship</i>	
Mean and habitually done literary activities	.26

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Mean and habitually done artistic activities	.19
Mean and habitually done recreational activities	.29

(C) SCHOLASTIC ACHIEVEMENT AND BEST LIKED ACTIVITIES

Elements of relationship

Mean and best liked literary activities	.04
Mean and best liked artistic activities	-.89
Mean and best liked recreational activities	.23

(D) SCHOLASTIC ACHIEVEMENT AND TOTAL RESPONSES IN DIFFERENT CATEGORIES

Elements of relationship

Mean and sum of all 'habitually done' activities	.45
Mean and sum of all 'never tried' activities	-.07
Mean and sum of all 'like to do' activities	-.04

VI. INTERPRETATION OF DATA

The means and the standard deviations shown above give an idea of the distribution of the check-list responses among the different types of activities of the first classification.

The correlations are presented in four parts. For the purposes of interpretation each part will be considered separately.

A.

The first set of three correlations displays relationships between the sum of squares (the measure of variability) and the habitually done literary, artistic and recreational activities. The correlations show whether pupils who are more variable in their examination scores do also habitually undertake such types of activity in a greater measure.

A look at the correlations reveals that all three are negative and non-significant. None of these support the idea that variability

in grade scores is related to the extent of instability in the activities that a pupil pursues.

B.

The second set of three correlations represents relationships between the grand mean of the totals of the grade scores (an index of pupils' level of scholastic achievement) and the extent of habitually done literary, artistic and recreational activities. They depict whether pupils who habitually undertake literary, artistic or recreational activities in a greater measure, do also have a higher level of scholastic achievement.

Two of these correlations are significant, but too low to be useful in prediction. However, engaging in a large number of activities has not been shown to be a bar to a pupil's scholastic achievement.

C.

The third set of three correlations reveal relationships between the grand means and number of the best liked literary, artistic and recreational activities.

These three are the most interesting correlations of the whole study. Two of these are positive, but low. The third which is negative is surprisingly high ($r = -.89$). This third one means that pupils who display a high degree of interest in and liking for artistic activities tend to have a low level of scholastic achievement. The inference lends itself to very important educational implications.

The last group of three correlations are between the grand means and the sum of all : (a) the habitually done activities, (b) those which the pupils might never have tried, and (c) the other which they would like to do if there were opportunity.

Two of these correlations are negative and very low. One is positive and significant. This last one (between the grand mean and the sum of all the habitually done activities) means that those pupils who achieve high marks habitually undertake a large number of activities than the less bright. The inference contradicts the

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common notion held by teachers that the larger the number of activities an individual undertakes the lower is the level of his scholastic achievement.

VII. CONCLUSION

To sum up, it may be said that the study confirms a few popular beliefs, rejects some others and reveals some new facts which had not occurred to the investigator, when the study was started. The inferences drawn from the study give us some valuable relationships which are likely to be of interest to the teachers and educational administrators.

As only a part of the data collected were used in the study, further work is possible with the help of the unused data. Relationships thus found out, it is hoped, will be interesting. The investigator, therefore, desires to follow up the study by using the data not utilized by the present study.

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APPENDIX

CHECK-LIST

Specifications of Check-List Activities Classification-wise

I

1. Literary	Individual	Active	Outdoor
2. Artistic	Group	Passive	Indoor
3. Visit	Individual	Active	Indoor
4. Recreational	Group	Passive	Outdoor

II

5. Literary	Group	Active	Indoor
6. Artistic	Individual	Passive	Indoor
7. Miscellaneous	Individual	Passive	Outdoor
8. Visit	Group	Active	Outdoor

III

9. Literary	Individual	Active	Indoor
10. Recreational	Individual	Active	Outdoor
11. Miscellaneous	Group	Passive	Indoor
12. Artistic	Group	Passive	Outdoor

IV

13. Miscellaneous	Individual	Passive	Indoor
14. Recreational	Group	Active	Indoor
15. Visit	Individual	Passive	Outdoor
16. Literary	Group	Active	Outdoor

V

17. Miscellaneous	Group	Passive	Outdoor
18. Recreational	Individual	Active	Indoor
19. Artistic	Individual	Active	Outdoor
20. Visit	Group	Passive	Indoor

VI

21. Literary	Individual	Passive	Outdoor
22. Visit	Individual	Passive	Indoor
23. Recreational	Group	Active	Outdoor
24. Artistic	Group	Active	Indoor

VII

25. Literary	Group	Passive	Indoor
26. Visit	Group	Passive	Outdoor
27. Artistic	Individual	Active	Indoor
28. Miscellaneous	Individual	Active	Outdoor

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VIII

29. Recreational	Individual	Passive	Outdoor
30. Artistic	Group	Active	Outdoor
31. Miscellaneous	Group	Active	Indoor
32. Literary	Individual	Passive	Indoor

IX

33. Literary	Group	Passive	Outdoor
34. Visit	Individual	Active	Outdoor
35. Recreational	Group	Passive	Indoor
36. Miscellaneous	Individual	Active	Indoor

X

37. Recreational	Individual	Passive	Indoor
38. Visit	Group	Active	Indoor
39. Miscellaneous	Group	Active	Outdoor
40. Artistic	Individual	Passive	Outdoor

XI

41. Artistic	Group	Passive	Indoor
42. Recreational	Group	Passive	Outdoor
43. Literary	Individual	Active	Outdoor
44. Visit	Individual	Active	Indoor

XII

45. Artistic	Individual	Passive	Indoor
46. Miscellaneous	Individual	Passive	Outdoor
47. Literary	Group	Active	Indoor
48. Visit	Group	Active	Outdoor

XIII

49. Artistic	Group	Passive	Outdoor
50. Recreational	Individual	Active	Outdoor
51. Literary	Individual	Active	Indoor
52. Miscellaneous	Group	Passive	Indoor

XIV

53. Visit	Individual	Passive	Outdoor
54. Recreational	Group	Active	Indoor
55. Literary	Group	Active	Outdoor
56. Miscellaneous	Individual	Passive	Indoor

XV

57. Recreational	Individual	Active	Indoor
58. Miscellaneous	Group	Passive	Outdoor
59. Visit	Group	Passive	Indoor
60. Artistic	Individual	Active	Indoor

XVI

61. Artistic	Group	Active	Indoor
62. Recreational	Group	Active	Outdoor
63. Visit	Individual	Passive	Indoor
64. Literary	Individual	Passive	Outdoor

XVII

65. Literary	Group	Passive	Indoor
66. Miscellaneous	Individual	Active	Outdoor
67. Artistic	Individual	Active	Indoor
68. Visit	Group	Active	Indoor

XVIII

69. Recreational	Individual	Passive	Outdoor
70. Artistic	Group	Active	Outdoor
71. Literary	Individual	Passive	Indoor
72. Miscellaneous	Group	Active	Indoor

XIX

73. Miscellaneous	Individual	Active	Indoor
74. Literary	Group	Passive	Outdoor
75. Visit	Individual	Active	Outdoor
76. Recreational	Group	Passive	Indoor

XX

77. Miscellaneous	Group	Active	Outdoor
78. Visit	Group	Active	Indoor
79. Artistic	Individual	Passive	Outdoor
80. Recreational	Individual	Passive	Indoor

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Education and Economic Growth in South-East Asia

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J. V. R. Rao

The authors have compared educational data pertaining to six countries of South-East Asia in relation to their economic growth rates. The countries are: China (Taiwan), Indonesia, Republic of Korea, Malaysia, the Philippines and Thailand. They find that a two-variable analysis of education and economic growth is largely infructuous. They have, therefore, suggested the systems-analysis approach as a competent and useful technique in understanding and determining the role of education in economic growth.

Although some earlier philosophers and economists like Adam Smith, H. Von Thunen and Irving Fisher recognised the need for broadening the concept of capital, economists at large were over-committed to a partial concept of capital limited to reproducible material objects. It is only recently that the knowledge, abilities skills acquired by the human beings became included, under the concept of "human capital", as a part of the general concept of capital. Following this, the need for investment in human capital is being increasingly realised in order to accelerate economic development and growth. To be sure, there are several modes of investment in human capital, and education is a most important one.

When we say that education is an investment in human capital, economists would be quick to ask the rate of its return. In fact, some of them have already arrived at the conclusion that the rate of return on investment in physical capital is higher than the rate of return on investment in human capital.¹ Such conclusions notwithstanding, it is argued that investment in education is not a bad enterprise. The reasons for such an argument are that there are indirect and non-economic benefits of education and it is not always possible to find quantitative expressions to all the benefits of education. What is, however, more important is that the general run of analyses of economics of education take it for granted that the existing educational system is the most appropriate one and the economy is growing in the right direction. Such analyses conceal rather than reveal all the benefits of education; they duck issues rather than face them squarely.

The purpose of the present paper is to see whether the differences in educational factors make for differences in economic growth in South-East Asia, viz., China (Taiwan), Indonesia, Republic of Korea, Malaysia,² the Philippines and Thailand. We will soon realise that such casual analysis reveals that there is hardly any relationship between education and economic growth. In the end some guidelines are provided to study the economic value of education by applying the technique of "systems analysis."

A word of caution seems to be in order before we proceed to look at the relationship between education and economic growth. Many a time, economists under-rate the contribution of education to economic growth and they defend themselves by taking shelter in the economic history of the new developed countries, particularly that of Great Britain, which shows that they could break the ice without a much favourable educational profile. A notion is also widespread among economists that the developing countries need not follow the same development pattern of the developed countries. For us, these two notions are incompatible. It is, however, reason-

¹See Arnold C. Harberger, "Investment in Men Versus Investment in Machines: The case of India," in C.A. Anderson and M.J. Bowman (eds.), *Education and Economic Development*, Aldine Publishing Company, Chicago, 1968, pp. 11-50.

²In this paper, Malaysia refers to West Malaysia unless otherwise mentioned.

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able to assert that in order to have a sustained economic growth, a favourable educational profile is essential because otherwise there are definite limitations for economic growth. Similarly, a favourable educational profile cannot by itself promote economic growth automatically when economic profile is unfavourable. The point we are trying to make is that education, like any one factor, is a necessary, but not a sufficient factor of economic development and growth.

Economic Growth

Economic development and growth is usually measured by per capita G.N.P. or per capita G.D.P. or per capita national income, although these development indexes are being increasingly questioned. Some attempts are being made to compute indexes of general socio-economic development.^{*} For purposes of the present paper, however, per capita G.D.P. is used as an index of economic development and growth. Before we actually proceed with the analysis of the data, we would like to inform the reader that we had to mainly depend on the published data collected and computed by the U.N. agencies. The data is not uniformly available for a specific interval of time and to this extent we are handicapped in not being able to make bold and fruitful generalisations.

TABLE 1
Growth Rate of Real GDP at Factor Cost during 1960-1967

<i>Country</i>	<i>Total %</i>	<i>Per Capita %</i>
China (Taiwan)	9.9	6.6
Indonesia	2.1	0.2
Korea, Republic of	7.7	4.8
Malaysia	6.4*	3.2
Philippines	5.0	1.6
Thailand	7.1	4.0

*1960-1965 only

SOURCE : U.N. *Monthly Bulletin*, September 1968

^{*}For example, see *Research Notes*, Nos. 1 and 2 of the U.N. Research Institute for Social Development, Geneva. Also see Jan. Drewnowski, *Level of Living Index*, Geneva: U.N. Research Institute for Social Development, 1966.

Although Table 1 is self-explanatory, a couple of observations may be made. First, there is a vast difference in the economic performance of the countries, China (Taiwan) ranking first and Indonesia last. Studies on the differential growth rates of economies should be challenging for both sociologists and economists. Secondly, the growth rate of per capita G.D.P. is, in the case of all the six countries, less than that of total G.D.P. This only explains the impalatable fact that in the race between economic growth and population growth, the latter has been the winner. Table 1, particularly the rank order of the countries according to the growth rate of per capita G.D.P., may be constantly kept in mind because in relation to this table or rank order of the countries that the tables that follow will be analysed.

Literacy

One of the crude ways of assessing the economic value of education is to see whether the differences in literacy rates make for differences in economic growth. Table 2 shows that of the six countries under study, the differences in literacy rates closely correspond to the differences in economic growth of three countries, viz., Indonesia, the Republic of Korea and Thailand. However, the differences do not correspond in the case of China (Taiwan), Malaysia and the Philippines. Thus, the relationship between literacy rates and economic growth is neither positive nor negative, but unpredictable. Secondly, the role of literacy as related to economic development may be conditioned or constrained by cultural norms and values of the region. However, keeping considerations of other kind in view, let us not jump at the conclusion that there is no relationship whatsoever between literacy rates and economic growth.

Although adult literacy ratio is often regarded as one of the important factors influencing the quality of labour, one seldom goes into the details such as the nature of literacy (whether functional or non-functional or dysfunctional) and whether every increase in adult literacy ratio produces a corresponding increase in economic growth. It is axiomatic that those who do not go beyond primary education in the developing countries soon either lapse into illiteracy

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TABLE 2
Percentage of Illiteracy by Sex

Country	Year	Percentage of Illiteracy		
		TOTAL	MALE	FEMALE
China (Taiwan)	1961	41.0	27.0	56.0
Indonesia	1961	57.1	42.8	70.4
Korea, Republic of	1960	29.4	16.6	41.8
Malaysia*	1962	47.0	41.0	52.0
Philippines	1960	28.1	25.8	30.5
Thailand	1960	32.3	20.7	45.9

*Including Singapore

SOURCES : 1. *Progress of Education in the Asian Region : A Statistical Review*, 1960

2. *Bulletin of the Unesco Regional Office for Education in Asia*, Vol. 1, No. 1, September 1966

or become dysfunctional illiterates in course of time. Gunnar Myrdal and Lester Pearson *et al.*, have recently observed that mere literacy or primary education has a dysfunctional effect in the economic behaviour of people in the developing countries. Furthermore, available evidence suggests that every increase in adult literacy ratio does not necessarily lead to a corresponding increase in economic growth. In their interesting study of role of education in development, Bowman and Anderson arrive at the conclusion that "through the range from 30 to 70 per cent literacy there is remarkably little increase in income with rising literacy rates." Therefore, one should not be tempted to posit that increments in literacy rates shall bring about increments in economic growth.

It may be noted in passing that in all the countries, except Indonesia, there are more literates than illiterates. However, female illiterates outnumber their male counterparts in all the countries. It is well known that women in the developing countries have been more tradition-oriented than men. But it is these women who rear and socialize the next generation. There is a need to educat-

*Mary Jean Bowman and C. Arnold Anderson, "Concerning the Role of Education in Development," in C. Geertz (ed.) *Old Societies, New States*, New York: The Free Press, 1963, p. 252.

ionally emancipate these women and make them internalize the new and appropriate values and norms and enlist their active participation in the process of economic development and growth."

Total Enrolment

Another crude way of evaluating the economic values of education is to look at the per cent of population enrolled at all levels of education. Table 3 shows the total enrolment as percentage of total population around 1955.

TABLE 3
Total Enrolment as Percentage of Total Population around 1955

<i>Country</i>	<i>Estimated mid-year population (Thousands)</i>	<i>Enrolment at all levels (Thousands)</i>	<i>Per cent of popula- tion enrolled</i>
China (Taiwan)	8,007	1,470	17
Indonesia	83,858	8,155	10
Korea, Republic of	21,520	3,781	18
Malaysia	8,000	964	14
Philippines	23,568	4,294	18
Thailand	22,762	3,336	15

SOURCE: *Bulletin of the Unesco Regional Office for Education in Asia*, Vol. 1, No. 1, September 1966

It may be observed that China (Taiwan), which takes the first place according to economic performance, takes the second place according to total enrolment yielding the first place to the Republic of Korea and the Philippines which according to economic performance, stand second and fifth respectively. The rank order of the other three countries, viz., Indonesia, Malaysia and Thailand remains the same. The relationship between total enrolment as percentage of total population and economic growth is not clear. It may be mentioned that Indonesia is far more populous than the other five countries. The disheartening performance by Indonesia

*David C. McLelland, *The Achieving Society*, Princeton N.J.: D. Van Nostrand, 1961, pp. 399-400.

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in the enrolment may be due partly to the disadvantage of having a large population, or lack of planned educational policy. However, total enrolment as percentage of total population does not enable us to know the proportion of enrolments at different levels of education. In a given country, the enrolment ratio at a particular level of education may be quite high or quite low. Clearly, this kind of imbalanced educational development cannot fulfil the needs of the economy of the country and is prone to adversely affect the country's economic growth. Our next step should, therefore, be to look at the percentage distribution of total enrolment by level of education.

Table 4 shows that the differences in percentage distribution of total enrolment by level of education are as wide as the differences

TABLE 4

Percentage Distribution of Total Enrolment by Level of Education around 1965

Country	Total	Percentage of Total Enrolment		
		FIRST LEVEL	SECOND LEVEL	THIRD LEVEL
China (Taiwan)	100.0	84.3	14.5	1.2
Indonesia	100.0	92.1	7.5	0.6
Korea, Republic of	100.0	78.7	19.8	1.5
Malaysia	100.0	88.6	11.3	0.1
Philippines	100.0	81.5	13.5	5.0
Thailand	100.0	88.5	10.7	0.8

SOURCE : *Bulletin of the Unesco Regional Office for Education in Asia*, Vol. 1, No 1, September 1966

in economic performance of the countries. In Indonesia, as high as 92.1 per cent of total enrolment, as compared with 78.7 per cent in the Republic of Korea, takes place at the first level of education. But at the second level, only 7.3 per cent of the total enrolment takes place in Indonesia, as compared with 19.8 per cent in the Republic of Korea. In the Philippines, 5.0 per cent of the total enrolment, as compared with only 0.1 per cent in Malaysia, takes place at the third level. It is difficult to establish a norm as to what should be the right percentage of distribution of total enrolment according

to level of education for economic growth. However, percentage distribution of total enrolment at different levels of education is one thing and enrolment ratio to school-age population is another because there might be serious differences in the age composition of the populations in different countries. Therefore, we may also look at the enrolment ratios at the first, second and third levels of education.

Enrolment Ratios

Of late, a debate has been going on whether developing countries should pay more attention to adult literacy programmes or to primary education.* Without going into the controversy we may simply see whether the differences in enrolment ratios at the first level make for differences in economic growth. Table 5 shows that in Indonesia just over 50 per cent of the school-age children, as compared with 115 per cent in Thailand, are enrolled at the first level of education. In the other countries, the ratios vary from 74 to 89. It may be noted that the rank order of the countries, except Indonesia, according to enrolment ratios at the first level does not correspond with their rank order by economic performance. This means that there is hardly any relationship between the two factors. This may be noted by those who over-emphasize the economic value of primary education. Primary education in developing countries is of extremely doubtful value for economic development because, unlike in the developed countries, it is, in general, pathetically low in quality and content. It neither, probably, weakens the traditional attitudes nor fosters knowledge, skill or technical mastery.[†] If anything, it puts premium on pattern maintenance and makes the children victims of conformity.

*For an excellent argument on the merits and demerits of adult literacy programmes and primary education, see Mark Blaug, "Literacy and Economic Development," *The School Review*, 74 (4), pp. 393-413.

†It has been found that there is no significant association between levels of education and secularity of Indian villagers. See J.V.R. Rao and H.S. Verma, "Secularity correlates and Health Practices Adoption," *Economic and Political Weekly*, Vol. IV, Nos. 45 and 46 (November 8, 1969), pp. 1783-1791.

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TABLE 5

Estimated Enrolment and Enrolment Ratios at the First, Second and Third Levels of Education around 1955

Country	Ratio of Enrolment to School-age Population		Number of Students at Third Level per 100,000 Inhabitants
	FIRST LEVEL	SECOND LEVEL	
China (Taiwan)	80	21	204
Indonesia	53	8	112*
Korea, Republic of	86	27	395
Malaysia	74	11	16**
Philippines	89	27	912
Thailand	115	9	112

*1961, 1954**

SOURCE : *Bulletin of the Unesco Regional Office for Education in Asia*, Vol. 1, No. 1, September 1960

Table 5 also shows that the ratio of enrolment at the second level to school-age population varies from 8 to 27. There is little or no association between economic growth and the ratio of enrolment at the second level to school-age population with the exception of Indonesia, the country with the lowest rate in per capita G.D.P. and the lowest enrolment ratio at the second level.

Table 5 further shows that in the Philippines as many as 912 students per 100,000 inhabitants, as compared with only 16 students in Malaysia, are enrolled at the third level of education. Here again the rank order of the countries, without exception, by the number of students enrolled at the third level per 100,000 inhabitants does not correspond with their rank order by economic performance. Thus, there is hardly any relationship between the enrolment ratios at the first, second and third levels of education on the one hand and economic growth on the other.

Vocational Education

It has been observed by several academics as well as Education Commissions that the developing countries should pay more

attention to vocational and technical education than to general education. An attempt is, therefore, made to see whether there is any association between the differences in percentage distribution of enrolment by type of education and the differences in economic growth. Table 6 shows the percentage distribution of enrolment by type of education at the second level around 1955. In Malaysia, as high as 92 per cent of the total enrolment at the second level, as compared with 57 per cent in Indonesia, takes place in general edu-

TABLE 6
Percentage Distribution of Enrolment by Type of Education at the Second Level around 1955

Country	Total	General	Vocational/ Technical	Teacher Training
China (Taiwan)	100	69	28	3
Indonesia	100	57	16	27
Korea, Republic of	100	82	18	2
Malaysia*	100	92	5	3
Philippines	100	93**	7	—
Thailand	100	87	12	1

*1960, **Including private vocational education.

SOURCE : *Bulletin of the Unesco Regional Office for Education in Asia*, Vol. 1, No. 1, September 1966

cation. But in Indonesia 27 per cent, as compared with 1 per cent in Thailand, takes place in teacher training. Our main concern here, however, is to compare the differences in percentage of enrolment in vocational and technical education and the differences in economic growth. Of course, China (Taiwan) ranks first both according to economic growth and the percentage of enrolment in vocational and technical education. According to percentage of enrolment in vocational and technical education, Indonesia and the Republic of Korea, which by economic growth rank sixth and second respectively, stand second. Here one might refer to Table 5, which shows that only 8 per cent of the school-age population in Indonesia, as compared with 27 per cent in the Republic of Korea, are enrolled at the second level of education, and say that 16 per cent of the enrolment at the second level in vocational and technical education

in both Indonesia and the Republic of Korea does not mean the same thing. Thailand ranks third both according to economic growth and enrolment in vocational and technical education. But Table 5 shows that only 9 per cent of the school-age population in Thailand, as compared with 27 per cent in the Philippines, are enrolled at the second level of education; Malaysia, which ranks fourth by economic growth, ranks last by enrolment in vocational and technical education. It may, therefore, be concluded that there is not as much association between economic growth and enrolment in vocational and technical education at the second level as one would have expected.

Table 7 shows the percentage distribution of enrolment by broad field of study at the third level of education. According to enrolment in engineering, medical sciences and agriculture at the third level, China (Taiwan) ranks first, Indonesia and the Philippines claim second and third ranks respectively. One might term the second rank of Indonesia spurious by referring to Table 5 which shows that only 112 students per 100,000 inhabitants are enrolled at the third level of education. But how does one go about explaining the fifth rank of the Philippines by economic performance in spite of the fact that in that country as many as 912 students per 100,000 inhabitants are enrolled at the third level of education and 31.4 per cent of them are enrolled in engineering, medical sciences and agriculture? Likewise, it is difficult to explain the lack of association between economic growth and the enrolment in engineering, medical sciences and agriculture in the other countries with the exception of China (Taiwan).

To make the discussion more argumentative, one might say that enrolment in engineering, medical sciences and agriculture at the third level refers to flow of graduates, which may not correspond with the actual number of graduates that join the labour-force owing to failures, dropouts, brain-drain, and so on. We may, therefore, see how closely the differences in the stock of graduates in engineering, medical sciences and agriculture correspond with the differences in economic growth.

Table 8 shows the distribution of graduates by broad field of study at the third level of education around 1960. Unfortunately,

TABLE 7
Percentage Distribution of Enrolment by Field of Study at the Third Level of Education

<i>Country</i>	<i>Year</i>	<i>Humanities, Education, Fine Arts</i>	<i>Law, Social Sciences</i>	<i>Natural Sciences</i>	<i>Engineering, Medical Sciences, Agriculture</i>	<i>Not Specified</i>
China (Taiwan)	1955	21.6	30.0	8.2	39.7	2.5
Indonesia	1956	7.4	49.9	6.0	36.7	..
Korea, Republic of	1956	25.0	35.0	10.9	29.1	..
Malaysia	1963	83.3	..*	4.7	12.0	..
Philippines	1957	31.5	36.4	0.7	31.4	..
Thailand	1959	9.0	72.3	5.5	13.2	..

*Law and Social Sciences are included with Humanities

SOURCE : *Progress of Education in the Asian Region : A Statistical Review, 1969*

TABLE 8

Percentage Distribution of Graduates by Field of Study at the Third Level around 1960

Country	Total	Humanities, Education, Fine Arts	Law, Social Sciences	Natural Sciences	Engineering, Medical Sciences, Agriculture	Not Specified
China (Taiwan)	100	30.0	26.5	7.4	36.0	0.1
Indonesia	n. s.	n. s.	n. s.	n. s.	n. s.	n. s.
Korea, Republic of	100	23.3	43.9	7.4	24.8	0.6
Malaysia *	100	87.5	—**	4.2	8.3	..
Philippines	100	37.5	36.0	1.0	25.4	0.1
Thailand***	100	31.6	32.2	9.0	27.2	..

* 1964, ** Law and Social Sciences are included with Humanities, *** 1961

SOURCE : *Progress of Education in the Asian Region : A Statistical Review, 1969*

the data for Indonesia are not available. With the exception of China (Taiwan), the differences in the stock of graduates in engineering, medical sciences and agriculture in the other countries do not correspond with the differences in their economic growth.

The Republic of Korea, which ranks second by economic growth stands fourth by the percentage of graduates in engineering, medical sciences and agriculture surrendering the second and the third ranks to Thailand and the Philippines respectively. Even if we concede that the differences in the percentage of graduates in engineering, medical sciences and agriculture in the Republic of Korea, the Philippines and Thailand are too small to be taken seriously, it is difficult to explain the case of Malaysia which ranks third by economic growth and last, i.e., fifth by the percentage of graduates in engineering, medical sciences and agriculture. Thus, there is hardly any association between the percentage of graduates in professional and technical education on the one hand and economic growth on the other.

Systems Analysis

The foregoing analysis shows that there is little or no contribution of education for economic growth. But the analysis treats education as existing in vacuum or isolation and not as a part of a society which demands different types of knowledge, abilities and skills at different periods of time. Systems analysis is essential to correctly assess the economic value of education and to build a meaningful educational development strategy.*

Systems analysis treats education both as a system by itself and as a sub-system of a wider social system, i.e., society. When education is treated as a system by itself the emphasis is on its units or components such as students, teachers, management, goals, etc. The components are interdependent and a change in one component brings about changes in other components. Let us, for instance, say that a change is necessary in the goals and priorities of education. This cannot be done without bringing about changes in other components such as teachers, content, learning aids, etc.

*For a brief system analysis of education, Phillip H. Coombs, *The World Educational Crisis: A Systems Analysis*, New York: Oxford University Press, 1968, pp. 8-15.

When education is treated as a sub-system of a wider social system, the emphasis is on the inter-relationships between education and other systems such as economy and polity. It hardly has to be emphasized that education and other sub-systems of a society are in constant interaction and a change in one sub-system necessitates changes in other sub-systems. Let us illustrate the point with the Indian case. A change in polity in the year 1947, brought about changes in the goals and needs of the economy. But education, which was geared to the needs of the colonial rulers, by and large, remains unaltered and is thus irrelevant to the needs of the present economy. The result is that, like most other developing countries, India suffers from a shortage of certain types of knowledge, abilities and skills.'

It is the responsibility of the planners to foresee the needs of the economy and bring about changes in the educational system so as to meet the needs. It may also be pointed out that educational system is usually held responsible if its outputs cannot be absorbed into economy as inputs. The fault could also be with economy. If planning is unsound, the optimum capacity of economy to absorb educational outputs may be reached much earlier than expected. The present unemployment problem of engineers is a case in point. When lack of integration of educational system with other sub-systems, particularly with economy, is not taken into consideration, the rate of return on investment in education is bound to be lower than the rate of return on investment in physical capital. This does not mean that investment in education as such is a bad enterprise. Systems analysis is alive to the above-mentioned and other problems and, therefore, a competent and useful technique of economic analysis of education.

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⁹See Harvey Leibenstejn, "Shortages and Surpluses in Education in Under-developed Countries: A Theoretical Foray," in Anderson and Bowman (eds.), *Education and Economic Development*, op. cit., pp. 51-62

The Effect of Classroom Behaviour Training on Classroom Interaction Patterns of Student-Teachers and Pupil Adjustment

N.K. Jangira

The study reported here was undertaken to compare two approaches—classroom behaviour training based on interaction analysis and the conventional student-teaching programme—in developing responsiveness, indirectness and flexibility in the classroom behaviour of prospective teachers. The study was conducted in two phases. In the first phase, the type of student-teaching formed the independent variable and classroom interaction patterns the dependent variables. In the second phase, the classroom interaction patterns constituted the independent variables, while pupil adjustment, classroom trust behaviour, and dependency formed the dependent variables. Classroom behaviour training was found to be the more effective strategy.

The ultimate aim of teacher education is to prepare effective teachers—teachers who are capable of bringing about desired behavioural changes in pupils under their charge to an optimal level in relation to the input in terms of human energy and material re-

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sources expanded in the process. Teacher education attempts, or is presumed to attempt, to meet this challenge following a few assumptions. In the first place, it is assumed that there is an adequate concept of teaching. Secondly, it is assumed that this concept of teaching can be operationalised in terms of teaching behaviour patterns invariably related to the desired educational outcomes. Thirdly, it is assumed that there are certain training techniques available, through which requisite teaching behaviour patterns can be developed in prospective teachers to effect the desired educational outcomes. Lastly, it is assumed that once the teaching behaviour patterns are acquired by prospective teachers during their course of training, these behaviour patterns are sustained and carried over to their assigned teaching positions in the profession till more efficient teaching behaviour patterns are discovered and learned.

Teacher Education: Without Feet

If assumptions of teacher education cited above are examined carefully, our teacher education programmes appear to be *ad hoc*, shaky and without feet. The prevalent concept of teaching is inadequate, as it fails to encapsulate the complex and fluid classroom transactions (Smith, 1963, 1971). The effective teaching behaviours are far from identified (Flanders and Simon, 1969). The utility of the conventional techniques of training employed in our teacher-training institute is doubtful. There is little relationship between what is taught in teacher education institutions and the actual performance of teachers in the classroom [Aspy, 1972, Edelfelt, 1972, and Jangira (in press). The gap between theory and practice has become proverbial. "Much of what is learned in education courses is neither conceptualised, quantified nor taught in a way that builds a bridge between theory and practice" (Flanders, 1967, p. 283). This state of teacher education can be attributed to inadequate research on teacher effectiveness and inadequacy of the prevalent training techniques.

Gaining Feet

A series of gloomy reviews of research on teacher effectiveness:

Orleans and Others (1952), Ackerman (1954), Moreh and Wilder (1954), Johnson (1955), Mitzel (1960), Barr (1960), Fattu (1962), Anderson and Hunka (1963), Medley and Mitzel (1963) and Biddle (1964) reflect the prevalent thaw in the field for more than half a century and consciousness about the need to remedy the situation. This led to concerted attempts. The results are optimistic. Medley and Mitzel (1963), and Simon and Boyer (1967, 1969) reviewed systems of classroom observation developed to collect empirical data on teaching. Smith (1961, 1966), Bellack (1963, 1966), Hughes (1959), Turner (1964), Gallagher (1968, 1971), Honigman (1968), Adams and Biddle (1970), and Flanders (1970) represent some of the significant attempts in this direction. The initial optimism can be marked in recent reviews (Gage, 1965, Amidon and Simon, 1965, Flanders and Simon, 1969, and Rosenshine 1971).

Along with break-through in analysing teaching behaviour, came a break-through in the techniques of training in teaching skills. The technique of interaction analysis providing systematic feedback about teaching behaviour, the techniques of micro-teaching and stimulated skill training exercises are proving more effective than the conventional practices being employed to impart teaching skills to student teachers (Flanders and Simon, 1969).

Need for Further Work

The breakthrough achieved in research on teacher effectiveness cited above is promising for teacher education, as it will provide the much-needed foundational data for streamlining the existing programmes. Whatever has been accomplished so far, however, is only spadework. Flanders (1969), conscious of the "primitive quality of our knowledge", felt that much still remains to be done. A lot of empirical data on effective teaching behaviours and techniques through which this teaching behaviour patterns can be developed in teachers are still needed. It is yet to be confirmed whether differential teacher education programmes produce differential teaching behaviours, and if they do, whether these teaching behaviours are carried over to the actual teaching performance of prospective teachers subsequently. Turner (1971), and Rosenshine (1971) stress

the need for experimental studies involving effectiveness of training resulting in specific performance by the teachers, as well as, its effect on pupil achievement.

The Present Study

The present study was designed to respond to the above need. The study envisages comparison of the effectiveness of two approaches—Classroom Behaviour Training (CBT) based on interaction analysis *vis a vis* conventional programme of student teaching—in developing responsiveness, indirectness and flexibility in the classroom behaviour of prospective teachers; follow-up of prospective teachers to assess sustenance and carry-over of the effects of CBT, when they join their assigned teaching positions; and comparison of students under the two groups of prospective teachers on adjustment, dependency and classroom trust behaviour. Pupil adjustment as outcome variable was selected as CBT was designed after Flanders (1970) and has an effective bias.

The study was conducted in two phases at the primary level. In the first phase, type of student teaching formed the independent variable and classroom interaction patterns formed independent variables. In the second phase, classroom interaction patterns assumed the status of independent variables, while pupil adjustment, classroom trust behaviour, and dependency formed the dependent variables.

Objectives of the Study

The specific objectives of the study were:

1. to provide to the group of student teachers CBT based on interaction analysis and compare classroom interaction patterns of this group of student teachers with the classroom interaction patterns of another group of student teachers having undergone conventional programme of student teaching;
2. to follow up the two groups of student teachers (1) above, when they join their assigned positions in the teaching profession to study sustenance and carry over of the classroom inter-

action patterns acquired in the training institute; and
3. to compare performance of the pupils under the two groups of student teachers at (2) above on Pre-Adolescent Adjustment Scale (PAAS), Pre-Adolescent Dependency Scale (PADS) and Pre-Adolescent Classroom Trust Schedule (PACTS).

Hypotheses

To achieve objectives of the study, following hypotheses were formulated:

1. Student teachers with CBT, at the end of their student teaching experience, will score higher on classroom interaction variables PPT, TRR, TRR 89, TQR, TQR 89, PIR, PSSR, and MFR, and will score lower on PTT, PSC, and SSR than the student teachers with conventional programme of student teaching.
2. The student teachers with CBT based on interaction analysis, after joining their assigned positions in the teaching profession, will score higher on classroom interaction variables PPT, TRR, TRR 89, TQR, TQR 89, PIR, PSSR and MFR and will score lower on PPT, PSC, and SSR, than the student teachers with conventional programme of student teaching.
3. The pupils under the student teachers with CBT based on interaction analysis will score higher on PAAS, PADS, and PACTS than the pupils under student teachers with conventional student teaching.

Sample

The study involved 20 matriculate male student teachers being prepared for primary schools.

The sample of pupils included in the second phase of the study was incidental, as it depended upon the school where a particular student teacher was appointed after the completion of the training. However, the department was requested to appoint the student teachers in schools which were similar as far as possible. The type of schools, management, and size of the school were taken into consideration for their appointment.

TABLE 1
Design of the Study

Phase Duration	TREATMENT		DATA COLLECTION	
	Control Group	Experimental Group	Control Group	Experimental Group
I One week	T ₁ -conventional programme of student teaching	T ₁ -conventional programme of student teaching	Observation of the classroom behaviour of student teachers using FIACS	Observation of the classroom behaviour of student teachers using FIACS
40 hours spread over 10 days	T ₁ -conventional programme of student teaching	T ₂ -Intensive classroom behaviour training based on interaction analysis		
Six weeks	T ₁ -conventional programme of student teaching	T ₃ -feedback based on interaction analysis	Post-training I observation of classroom behaviour of the student teachers using FIACS	Post-training I observation of classroom behaviour of the student teachers using FIACS
Two weeks	T ₁ -conventional programme of student teaching	Feedback based on interaction analysis stopped	Post-training II observation of classroom behaviour of the student teachers	Post-training II observation of classroom behaviour of the student teachers
II After fourteen weeks		No treatment	(a) Post-training III observation of classroom behaviour of the student teachers, when they join their schools, using FIACS (b) Pre-test administration of the PAAS, PADS, PACTS to the pupils. (c) Post-training IV observation of the classroom behaviour of student teachers using FIACS	(a) Post-training III observation of classroom behaviour of the student teachers, when they join their schools, using FIACS (b) Pre-test administration of the PAAS, PADS, PACTS to the pupils. (c) Post-training IV observation of the classroom behaviour of student teachers using FIACS
After eight weeks			Post-test Pupil's performance on PAAS, PADS and PACTS	Post-test Pupil's performance on PAAS, PADS and PACTS

TABLE 2

Independent Variables, Dependent Variables and Controls

CONTROL			Controls Employed	
Phase	Independent Variables	Dependent Variables	Factors	
I	Type of student teaching experiences Conventional	Classroom interaction variables PPT, PPT, PSC, TRR, TQR, TRR 89, TQR	1. Sex of student teachers 2. Grade to be taught 3. Subject to be taught	1. Administrative (only males selected) 2. Administrative (only Class VI to be taught) 3. Administrative (English structures to be taught) 4. Statistical (Analysis of co-variance)
	Based on Classroom Behaviour Training	89, PIR, SSR, PSSR, CCR, MFR	4. Initial ability of student teachers	
II	Type of student teaching experiences and resultant classroom interaction variables	Pupil performance on PAAS PADS PACTS	5. Contamination between the experimental and control groups 6. Knowledge of the experiment	5. Administrative (Isolation of the two groups) 6. Administrative (Ignorance about the experiment)
	PPT, PPT, PSC, TRR, TQR, TRR 89, TQR, 89, PIR, SSR, PSSR, CCR, MFR		7. Intersession history 8. Maturation 9. Testing 10. Regression 11. Instrumentation 12. Other teachers' influence on pupils 13. Pupil's initial ability 14. Treatment fidelity	7. Design 8. Design 9. Design 10. Design 11. Observation reliability 12. Administrative (One-teacher one-class system) 13. Statistical (Analysis of co-variance) 14. Actual observation of the classroom behaviour of teachers

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The number of pupils under the student teachers in control and experimental groups was 185 and 213 with an average of 18.5 and 21.3 respectively. The average age of the pupils in the two groups was 9.95 years and 10.02 years respectively.

Design of the Study

The study employed pre-test and post-test enrolled group design in two phases. Table 1 summaries the design and Table 2 lists dependent variables, independent variables, factors impinging upon the validity of the study, and the kind of controls employed.

Tools Used

Flanders Interaction Analysis Category System (FIACS): This is a widely used observational tool comprising ten categories. The first seven categories classify teacher talk, two categories classify pupil talk, and the last category records silence or confusion. The ten categories are: accepts feeling, praises or encourages, accepts or uses ideas of pupils, asks questions, lecturing, giving directions, criticising of justifying authority, pupil talk-response, pupil talk-initiation and silence or confusion.

Pre-Adolescent Adjustment Scale (PAAS): This is a scale developed by Pareek and Rao (1970) to measure adjustment of pre-adolescents towards home, school, peer, teacher, and it also measures general adjustment, it consists of 40 items covering the five areas of adjustment: home, peer, school, teacher and general adjustment. Reliability and validity coefficients are given in Table 3.

TABLE 3
Range of Scores, Test-Retest Reliability Coefficients, and U-Values (PAAS)

Scales		Range of Scores	Test-Retest Reliability (a)	Test-Retest Reliability Control Group (b)	U-Values for Validity
Home	+	10 to -10	.46	.54	.008 and .206
School	+	6 to -10	.60	.63	.001
Peers	+	6 to -10	.54	.52	.028
Teachers	+	6 to -10	.278	.48	Not given
General	+	6 to -6	.44	.53	.100 and .028
Total + 34 to -46					

(a) Highest value taken.

(b) Computed from the scores of pre-test and post-test scores of the control group.

Pre-Adolescent Dependency Scale (PADS). Form A: PADS Form A consists of ten items. The first half are dependency items, while the other half denotes independency (or lack of dependency). It contains items like:

I blindly follow everything the teachers tell me.
I am easily persuaded by others.

The pupil is required to read the item, and tick mark (✓) against the item in one of the three columns 'mostly', 'sometimes', and 'rarely' which he thinks represents his position. The items are scored 2, 1, 0 for 'mostly', 'sometimes' and 'rarely' for independence items, 0, 1, 2 for 'mostly', 'sometimes' and 'rarely' for independence items. The total of all scores gives dependency score for an individual. Test-retest reliability has been reported to be .77 by Pareek and Rao (1970). The test-retest reliability worked out from the pre-test scores of the control group in the present study is .74.

Pre-Adolescent Classroom Trust Schedule (PACTS): PACTS is a semi-projective tool. It consists of common classroom situations calling for pupil's reaction or the actions proposed in the situations. The responses are scored 4, 3, 2, or 1 according to the degree of trust, represented by the response. The split-half reliability of the scale has been reported to be .814 and the test-retest reliability .77. The test-retest reliability worked out from the pre-test and post-test scores of the control group is .71.

Classroom Behaviour Training

The Basis: The CBT will have to take into account the effective teaching behaviours and techniques of training found to be suitable for developing the same in teachers. Process-product studies and presage-process studies with particular reference to training were surveyed for the purpose.

Process-Product Studies: Despite few studies failing to support the relationship between teacher acceptance and use of pupil ideas and product-variables (Snider, 1966, Birkin, 1967, Measel 1967), it appears that teacher responsiveness rather than initiation, teacher acceptance and use of students' ideas or opinions and flexibility of teacher influence in the classroom, are positively related

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to pupil achievement in different content areas, as well as a number of other outcomes variables like attitude, independence and self-direction, verbal recall, creativity, incidence of thought provoking questions, manipulative skills (Flanders 1965, 1969, 1970 ; Morrison 1966; Hariman 1967; Lashier 1967; Nelson 1964; Schantz 1967; John 1968; Dodi 1966; Pareek 1965; Weber 1968; Alexander 1970; Mitra 1970; Furst 1967; Soar 1969; Pareek and Rao 1971).

Presage-Process Studies: Presage-process research includes studies linking teaching process to teacher characteristics and formative experiences including training. This coverage, however, is confined to the research linking training experiences of teachers and their teaching behaviours. Flanders (1963, 1969), Amidon and Powell (1966), Moskowitz (1967), Zahn (1967), Simon and Others (1966), Simon (1967), Hough (1967), Lohman, Ober and Hough (1967), Amidon (1967), Hough and Amidon (1967), Hanny (1967), Ishler (1967), Davidson (1968), Wood and others (1969), Wright, Nuthall and Lawrence (1969), Holcomb (1970), Pareek and Rao (1971) and Nath (1971) report effective use of feedback based on interaction analysis, singly or combined with simulated training or micro-training, in modifying the teaching behaviour patterns of the pre-service or in-service teachers in the intended direction. In other words, when pre-service or in-service teachers receive instruction in interaction analysis, they analyse their own behaviour, formulate directions of change, receive continuous feedback about their observed teaching behaviours, they tend to change their teaching behaviour in the desired direction.

CBT should take into account the implications of 'process-product' and 'presage-process' studies cited above.

The first phase of the CBT comprise 40 hours' training spread over 10 days. It provides to the student teachers grounding in the concept of teaching, classroom behaviour patterns as the basis of teaching, classroom teaching as an interactive process, the broad concept of the classroom climate, and analysis of teaching. FIACS is also to be introduced to the student teachers. In this context, teaching style, teacher influence, responsiveness, flexibility of influence are explained. Ten categories with a number of illustrations explaining them are discussed in detail. Ground rules for record-

ing observation are dealt with. Besides discussion, mimeographed material on FIACS is provided to the students.

The situations presenting different categories are created through role play. Materials for the observation having been introduced to the group, recording is done on role play situations to start with. The concept of inter-observer reliability after Scott's coefficient of agreement is introduced and its computation is worked out. Preparation of 10×10 interaction analysis matrix is followed then. The student teachers are introduced to its preparation and interpretation. After this, the group devotes one hour to observing classroom teaching in schools. Blind matrix analysis exercises are quite useful as well as interesting. At the end of the training, some research using interaction analysis is discussed. There is a discussion on effective teaching behaviours and a few exercises in modification of teaching behaviour taking up micro-situations are undertaken. The future programme of providing feedback based on interaction analysis to the student teachers is finalised.

Intensive CBT described above is followed by feedback based on interaction analysis. Student teachers in the experimental group are assigned in pairs to the cooperating schools. The student teachers observe using FIACS, while other gives lesson and gives the observation data to the student teacher observed to prepare interaction matrix and compute classroom interaction variables. Every alternate day, the supervisor has individual discussion with student teachers to provide feedback on the basis of the interaction analysis data from their matrices. They fix up the target in each meeting for the lesson to follow, discuss the direction of change in the interaction patterns and how this can be achieved. This type of feedback continues for six to eight weeks.

Procedure

Assignment of the Subjects: Ten student teachers were assigned to the control group and another ten to the experimental group randomly through using table of random numbers. The assignment of pupils in second phase of the study was incidental, as it depended upon the school in which a particular student teacher was appointed after completing his training.

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Pre-training Stage: The experimental and the control groups followed the same curriculum in theory and practice of education. These included course in (1) Foundations of education including problems of primary education; (2) Educational Psychology; (3) Principles and Methods of Teaching; (4) Method of teaching English, Vernaculars, Social Studies and General Science; (5) Health Education; (6) Art Education; (7) Gardening; and (8) Elementary Carpentry. The course was covered through lectures, group discussions and projects. The preparation of lesson plan, teaching aids, other instructional materials were also undertaken. Both the groups covered this part of the curriculum in the same way.

After the preparatory work for student teaching experience like preparation of the curriculum plan, teaching units, sample lesson plans, unit tests, etc.; which was common to both the groups, the experimental group was shifted to the campus of a cooperating school. Arrangement for their boarding and lodging was made there to avoid contamination between the control and the experimental groups during CBT. At the same time, caution was taken not to allow the experimental group grow conscious about the special arrangement. Nor were they told that the experiment was being conducted. They were told that this arrangement was being made to render their work convenient as the distances were too long and transport arrangement inadequate.

Pre-training Observation: During the first week of student teaching programme, initial verbal classroom behaviour of student teachers in the control and experimental groups was recorded using FIACS. Each student teacher was observed twice for a time spell of 30 minutes each session. Pre-training scores of the classroom interaction variables were computed from the observation data.

Administering Classroom Behaviour Training: After taking initial measures of the classroom behaviour of the student teachers, the control group continued its programme of student teaching on the conventional pattern. The experimental group was provided T, i.e., intensive CBT. This was followed by feedback based on interaction analysis for six weeks.

Post-training Observation I: After the completion of the CBT, the student teachers in the control and experimental groups were

observed in two sessions of 30 minutes each using FIACS. Interaction variables were computed to study the change during the period of CBT in experimental and control groups. Pre-training and post-training observations provide data to test the first hypothesis.

Post-training Observation II : Treatment to the experimental group was stopped after the first post-training observation. The experimental group was provided no feedback. After two weeks, post-training observation II was taken to study the sustenance of the effect of CBT.

The Gap

The student teachers completed their training in December, 1970. They were appointed by the education department and joined their assigned teaching positions in April, 1971. Thus during the period between December, 1970 and April, 1971, there was no treatment. Moreover, there was no teaching.

Post-training Observation III : As the student teachers joined their assigned teaching positions their classes were observed again in two sessions of 30 minutes duration each. The student teachers taught English structures to Class IV. 'One-teacher-one-class' system was adopted to minimise, if not totally eliminate, other teachers influencing the pupils during experimentation. This measure served two purposes. Firstly, it helped in assessing the sustenance of the CBT for a longer period of time, and secondly, it served as a test of treatment fidelity during second phase of the study.

Pre-test Performance of the Pupils on PAAS, PADS and PACTS: Synchronized with post-training observation III, PAAS, PADS and PACTS were administered to the pupils to obtain their pre-test scores on these variables of pupil outcomes. These scores were used for adjusting post-test scores of the pupils for their initial performance on PAAS, PADS and PACTS through analysis of covariance.

Post-training Observation IV: After another eight weeks, the classes with the control and the experimental groups were observed again. This served two purposes. Firstly, it provided data for the study of sustenance and carry over of the CBT effect and secondly

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for treatment fidelity during phase II of the study.

Post-test Performance of the Pupils: Synchronized with post-training observation IV, the pupils were administered PAAS, PADS and PACTS. This provided for comparing the performance of the pupils under the experimental and the control groups of student teachers to test the third hypothesis.

Statistical Analysis: To test the significance of difference between the classroom interaction variable scores of the control and the experimental groups of student teachers after CBT, the post-test scores were adjusted for initial scores through 2×2 analysis of covariance. To test significance of difference between the performance of the pupils under experimental and control groups of student teachers, post-test scores of pupils' performance were also adjusted for initial ability through 2×2 analysis of covariance. Scott's coefficient of agreement was calculated to assess inter-observer reliability.

Results: Classroom Behaviour Training

In this section, the data has been organised to test hypotheses 1 and 2 relating to the effect of CBT. Analysis of the data purported to answer such questions as: did the experimental group act differently than the control group after the completion of CBT? If so, did it act differently in the hypothesised direction? Did the experimental group continue to act differently in the same direction even after the two groups joined their teaching positions in schools, or in other words, did the experimental group sustain and carry over the effect of CBT to the teaching positions in schools they occupied after completing their training? To answer these questions, simple 2×2 analysis of covariance was carried out with a view to adjusting post-training scores on interaction variables for pre-training scores, in respect of all the four post-training scores. Table 4 gives pre-training means, post-training means, adjusted means, F-Values, and corresponding 'P' values.

An examination of Table 4 reveals that after CBT the experimental group acted differently than the control group. All, but one, interaction variables reached levels of significance ranging from 0.01

TABLE 4

Comparison of the Control and the Experimental Groups on Interaction Variables Immediately after the CBT (Post training I)

Interaction Variables	Group	Pre-training Mean	Post-training (I) Mean	ANCOVA Adjusted Mean	F	P
MFR	Control	4.56	5.32	5.18	5.41	P > 0.05
	Experimental	5.60	9.02	8.89		
PTT	Control	78.34	80.02	79.19	9.57	P > 0.01
	Experimental	82.71	68.82	69.50		
PPT	Control	13.64	11.72	12.35	8.48	P > 0.01
	Experimental	10.15	27.15	25.58		
PSC	Control	8.12	8.26	8.46	4.76	P > 0.05
	Experimental	8.38	4.03	3.92		
TRR	Control	54.25	52.21	53.81	8.85	P > 0.01
	Experimental	50.38	75.48	74.52		
TRR 80	Control	38.59	41.03	40.95	6.14	P > 0.05
	Experimental	40.91	56.73	57.54		
TQR	Control	9.12	8.50	8.79	7.93	P > 0.05
	Experimental	10.05	10.93	18.56		
TQR 80	Control	20.35	22.18	21.67	5.05	P > 0.05
	Experimental	19.32	30.02	31.48		
PIR	Control	14.82	13.28	14.32	4.54	P > 0.05
	Experimental	15.23	22.79	23.82		
CCR	Control	81.82	83.21	82.56	5.81	P > 0.025
	Experimental	78.83	64.72	65.98		
SSR	Control	80.58	83.72	84.39	5.26	P > 0.05
	Experimental	82.19	72.03	70.84		
PSSR	Control	51.82	49.17	48.34	3.01	NS
	Experimental	48.35	65.28	64.12		

to 0.05. The difference between pre-training and post-training I on PSSR failed to reach level of significance. The data support the first hypothesis which implies that the CBT was effective in producing

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ing significant changes in classroom interaction patterns of the experimental group except in the case of PSSR.

Table 5 gives results in respect of post-training II scores.

TABLE 5

Comparison of the Control Group and the Experimental Group on Interaction Variables a fortnight after OBT (Post-training II)

<i>Interaction Variables</i>	<i>Group</i>	<i>Pre-training Mean</i>	<i>Post-training II Mean</i>	<i>ANAOVA Adjusted Mean</i>	<i>F</i>	<i>P</i>
MFR	Control	4.58	3.26	3.85	7.29	P > 0.025
	Experimental	5.68	9.82	9.38		
PTT	Control	78.34	76.09	77.54	8.63	P > 0.01
	Experimental	82.71	69.72	68.01		
PPT	Control	13.54	11.01	10.38	8.51	P > 0.01
	Experimental	10.15	20.33	21.54		
PSC	Control	8.12	12.30	10.02	1.15	NS
	Experimental	6.38	9.95	10.89		
TRR	Control	54.25	52.18	53.28	8.76	P > 0.01
	Experimental	56.38	73.82	91.97		
TRR 89	Control	38.59	41.43	40.25	5.31	P > 0.05
	Experimental	40.91	55.19	56.82		
TQR	Control	9.12	8.72	8.32	7.56	P > 0.025
	Experimental	10.05	17.35	18.58		
TQR 89	Control	20.35	19.10	17.69	5.51	P > 0.05
	Experimental	19.32	27.53	28.02		
PIR	Control	14.82	16.92	16.37	4.86	P > 0.05
	Experimental	15.23	21.37	22.68		
COR	Control	81.82	77.26	78.35	6.30	P > 0.025
	Experimental	78.83	65.48	64.32		
SSR	Control	80.58	82.83	81.20	5.75	P > 0.05
	Experimental	82.19	73.34	72.02		
PSSR	Control	51.82	54.39	52.25	3.21	NS
	Experimental	48.35	66.54	65.35		

It will be seen from Table 5 that the significant difference in the interaction patterns featuring the experimental and the control groups immediately after the CBT were sustained two weeks after the training. Only one interaction variable PSC became not significant in addition to PSSR which was not significant even in post-training I. The levels of significance of the other variables vary from 0.01 to 0.05.

Post-training III: The experimental and the control groups were observed 17 weeks after the CBT in altogether a different situation. At this stage, the student teachers had joined their teaching positions in schools assigned by the education department. The data has been summarised in Table 6.

TABLE 6

Comparison of the Experimental and the Control Groups on Interaction Variables Just after the Groups Joined Their Teaching Positions in Schools (Post-training III)

Interaction Variables	Group	Pre-training Mean	Post-training III Mean	ANACOVA Adjusted Mean	F	P
MFR	Control	4.56	5.48	5.01	0.75	P > 0.05
	Experimental	5.06	6.86	6.54		
PTT	Control	78.34	75.32	77.24	7.51	P > 0.025
	Experimental	82.71	68.82	69.78		
PPT	Control	13.54	12.47	12.89	8.77	P > 0.01
	Experimental	10.15	21.55	23.26		
PSC	Control	8.12	12.21	9.89	0.94	NS
	Experimental	6.38	9.63	10.06		
TRR	Control	54.25	50.92	52.01	8.46	P > 0.01
	Experimental	56.38	68.35	70.08		
TRR 39	Control	38.59	43.34	41.32	4.85	P > 0.05
	Experimental	40.91	52.83	54.28		
TQR	Control	9.12	11.52	10.54	7.25	P > 0.02
	Experimental	10.05	17.38	17.02		
TQR 39	Control	20.35	19.53	18.42	5.56	P > 0.05
	Experimental	19.32	27.69	28.13		

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<i>Interaction Variables</i>	<i>Group</i>	<i>Pre-training Mean</i>	<i>Post-training III Mean</i>	<i>ANACOVA Adjusted Mean</i>	<i>F</i>	<i>P</i>
PIR	Control	14.82	14.38	16.35	4.53	P > 0.05
	Experimental	15.23	21.75	21.34		
OOR	Control	81.82	82.05	83.24	7.77	P > 0.025
	Experimental	78.83	86.28	84.57		
SSR	Control	80.58	84.68	81.59	5.40	P > 0.05
	Experimental	82.19	70.38	72.58		
PSSR	Control	51.82	48.21	50.13	3.07	NS
	Experimental	48.35	63.12	61.82		

An examination of Table 6 reveals that the significant differences in respect of the interaction variable that marked the experimental and the control groups after post-training II, persisted after 17 weeks as well. The level of significance, in respect of two variables, however, showed a decline. The level of significance of PTT fell from 0.01 to 0.025 and the level of significance of MFR fell from 0.025 to 0.05. PSC and PSSR remained not significant at this stage as well. This implies that most of the effects of CBT were retained by the student teachers even 17 weeks after imparting. Another notable fact revealed by the present analysis was that the effects of CBT produced in the experimental group during their student teaching experience, were not confined to their performance in training institute only, but were carried over to the actual teaching performance, when they joined schools after completing their training. The data support second hypothesis and answer the second question that was posed in the beginning of the present section.

Post-training IV: Last of all, the experimental and the control groups were again observed during the second phase of the study after a lapse of 26 weeks. Table 7 gives the results.

TABLE 7

Comparison of the Control Group and the Experimental Group on Interaction Variables after 24 Weeks of CBT (Post-training IV)

<i>Interaction Variables</i>	<i>Group</i>	<i>Pre-training Mean</i>	<i>Post-training IV Mean</i>	<i>ANALCOVA Adjusted Mean</i>	<i>F</i>	<i>P</i>
MFR	Control	4.66	4.07	4.01	6.13	P 7 0.06
	Experimental	5.60	8.98	9.20		
PTT	Control	78.34	76.80	78.26	6.22	P 7 0.06
	Experimental	82.71	68.01	70.12		
PPT	Control	13.64	13.15	12.64	7.51	P 7 0.025
	Experimental	10.15	10.03	28.16		
PSC	Control	8.12	9.96	9.21	0.71	NS
	Experimental	6.38	12.33	10.32		
TRR	Control	64.26	66.21	66.80	8.02	P 7 0.01
	Experimental	60.38	68.72	68.91		
TRR 89	Control	38.69	49.08	39.28	4.59	P 7 0.06
	Experimental	40.01	60.86	61.67		
TQR	Control	6.12	10.53	16.87	7.42	P 7 0.06
	Experimental	10.06	16.63	16.62		
TQR 89	Control	20.36	10.84	19.06	5.62	P 7 0.06
	Experimental	19.32	26.97	26.68		
PIR	Control	14.82	16.76	14.81	4.70	P 7 0.06
	Experimental	16.23	20.789	20.46		
CCR	Control	81.82	82.67	83.64	7.37	P 7 0.06
	Experimental	78.83	61.63	61.03		
SSR	Control	80.68	82.23	83.06	5.37	P 7 0.06
	Experimental	82.18	71.34	71.66		
PSSR	Control	61.82	48.89	49.76	2.38	NS
	Experimental	48.36	60.18	68.64		

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Discussion

Several points emerge from examination of the data and the results presented earlier. In the first place, it appears feasible to develop the desired classroom interaction patterns in prospective teachers, if appropriate strategy is employed in their training. CBT based on interaction analysis used in the present study may be considered as one of the strategies which has been found to be more effective in accomplishing the above objective as compared to the conventional programme of student teaching offered to the prospective teachers. The experimental group, at the end of their student teaching experience, talked less, was more responsive to pupils, encouraged more pupil participation and even initiation during the classroom discourse, had more flexibility in classroom behaviour than the control group. The results are in agreement with the findings reported by Amidon and Powell (1966), Amidon and Others (1967), Ober (1966), Hill (1967), Davidson (1968), Pareek and Rao (1971), and Nath (1971). This implies that CBT based on interaction analysis can be used as one of the training strategies effectively, if once conceptual basis of the interaction patterns is prepared, it is operationalised into the behaviour patterns, an objective, reliable and valid system of observation of classroom teaching is developed, the prospective teachers are oriented to the system, and they are provided intensive feedback to acquire the target classroom behaviour patterns.

Secondly, most of the interaction patterns acquired during the training, were sustained even 17 to 26 weeks after the training was completed in altogether a new situation, when the prospective teachers assumed charge of their designated teaching positions in the education department. In other words, the behaviour patterns acquired during their student teaching in the training institute did not only confine to the training institute, but the prospective teachers also carried these interaction patterns to the actual field of teaching in schools they joined after their training in the institute was completed. This establishes a closer relationship between the teacher education programme and subsequent performance of its products in the field. This augurs well for teacher education.

However, in most of the interaction variables, after initial im-

provement in the hypothesised direction, a declining trend without reaching significance was discernible. Is it that the experimental group of student teachers will relapse into their original behaviour patterns after a further lapse of time? If so, after how much time and why? Will all of them relapse or only a few? Is the relapse related to some institutional characteristics like organizational climate, academic climate, cultural influences, etc.? If so, what type of teachers, in what type of institutions, and under what conditions will relapse? These questions can be answered by further empirical research. The investigator feels that the student teachers joined their teaching positions in schools three months after completing their training. There was no teaching work during this period due to winter vacation and they had no opportunity to teach. This may have affected their interaction patterns. But if this contention is accepted, the interaction patterns should have shown improvement in post-training observation IV, since they had taught for two months by that time. Another reason can be that there was no feedback to teachers during their teaching in the schools, and so they could not exactly assess their classroom performance objectively. This appears to be a more viable reason. Probably, training in "self-inquiry projects" on the patterns suggested by Flanders (1970) may be more effective when employed as a part of CBT. In that case, the student teachers trained in interaction analysis may be appointed in pairs, so that the inquiry projects requiring each others' observation of classroom teaching can be carried on. By way of conclusion, the relapse problem needs serious investigation and search for ways and means to check it.

Results: Classroom Behaviour Training and Pupil Performance

The experimental and the control group of teachers assumed charge of their assigned teaching positions in the profession after completing their training in the institute. All of them were assigned Class IV following "one-class one teacher" system in order to minimise, if not totally eliminate, other teachers influencing the pupils during second phase of the study. The headmasters and the inspectors were approached with a request not to directly influence

TABLE 8

Pre-test, Post-test and Anacova Adjusted Mean Performances of Pupils on PAAS, PADS, and PACTS under the Experimental and the Control Group of Student Teachers

Outcome Variables	Pre-test Mean		Post-test Mean		Anacova Adjusted Mean		F Value	P Value
	Control Group	Experimental Group	Control Group	Experimental Group	Control Group	Experimental Group		
Adjustment (Home)	4.65	4.26	4.21	6.12	4.45	6.31	2.44	NS
Adjustment (School)	0.97	0.85	1.05	3.81	1.07	3.97	4.32	P > 0.05
Adjustment (Peers)	1.89	1.63	1.97	4.03	1.77	4.23	3.78	P < 0.05 P > 0.10
Adjustment (Teachers)	1.23	1.18	1.15	3.98	1.19	3.87	5.20	P > 0.05
Adjustment (General)	2.38	2.21	1.32	4.76	2.49	4.66	4.11	P > 0.05
Independency	4.35	4.68	4.97	12.56	6.12	12.32	5.08	P > 0.05
Classroom Trust	19.83	17.68	18.95	25.69	19.26	25.31	4.02	P > 0.05
N=185		N=213	N=186	N=213	N=185	N=213		

the classroom teaching of these teachers. They responded positively.

In order to test the third hypothesis, which states that pupils under the experimental group of student teachers will perform better than pupils under the control group, on PAAS, PADS and PACTS, the pupils were measured twice on the three variables—once immediately after the student teachers joined their respective teaching positions in schools synchronizing with post-training observation III, and again after a period of eight weeks synchronizing with post-training observation IV. Tables 4 to 7 in the preceding section show that the experimental and control groups differed significantly on interaction variables in hypothesised direction, thus demonstrating treatment fidelity to some extent. A 2×2 analysis of covariance was carried out to adjust post-test scores for initial scores of the pupils to test the hypothesis. The data is presented in Table 8.

An examination of the results in Table 8 reveals that the pupils under the experimental group performed better than the pupils under the control group of student teachers in three areas out of five on PAAS, the differences in PAAS (Home) being not significant and in PAAS (Peers) reaching a significance level of only 0.10. The experimental group also performed better than the control group on PADS and PACTS. In other words, if the teachers are more responsive, encourage more pupil participation and initiation, and have more flexibility in the classroom behaviour patterns, or alternatively, they have the configuration of interaction patterns that the experimental group in the present study had, there is a likelihood that the pupils under their stewardship will have better adjustment towards the school, the teacher, the peers, the home, and will have better general adjustment; they are likely to have less dependency; and higher classroom trust level. The data support the third hypothesis.

Conclusion

The findings of the study cannot be generalised due to limitations of the sampling. However, results are promising. There is a need to carry out controlled experiments replicating, particularly, the process-product part of this study so as to gather sufficient data

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for making generalisations useful to understand and improve teaching.

Implications

On the basis of the findings and the conclusions reported above, some specific implications for teacher education, teaching and research in the area are outlined in this section.

Teacher Education: The findings regarding CBT indicate favourable results. If the results are viewed in conjunction with the presage-process study reviewed earlier reveal that if the teachers or student teachers know the teaching concept operationalised in terms of teaching behaviours, if they know how to analyse their own teaching behaviours, if they can formulate hypothesis about the teaching behaviours for the educational outcome they want to engender in their pupils, and if they are provided with objective specific feedback regarding their observed teaching behaviours, there is a likelihood that they will modify their teaching behaviours accordingly. CBT based on interaction analysis is one of such training programme. This has been tried out with live observers because still we are not in a position to provide sophisticated mechanical gadgets in the classrooms. It is not costly in terms of material resources. Only human resources have to be mobilised and duly trained. Financial resources are required in as much as they are needed for training personnel in the technique.

The system of interaction analysis used in this study has implications for the supervision of student teaching as well. Here is a tool which can provide objective and specific feedback to student teachers about their teaching behaviour in contrast to the vague feedback the supervisors provide usually. The tool can be modified to suit the purpose, if needed. A modified system of interaction analysis combining affective as well as cognitive aspects of teaching has been developed by Jangira (1972) which is being tried out in the institute. There appears to be a rationale and the need for such efforts, if teacher education programmes are to be made more effective. The use of the instrument in evaluation of student teaching appears in Jangira (in press).

One of the findings indicate the tendency of the student teachers to relapse into original behaviours as time passes. This may be due to lack of periodical feedback needed by the teacher to analyse and evaluate his own teaching behaviour. Two things are suggested to make the CBT programmes more effective in the field. Firstly, 'scientific inquiry projects' on teaching may also be included and tried out in future CBT. It appears that these kinds of projects will develop a scientific spirit among teachers to study and carry out modification of their teaching behaviour as the teaching situations demand. Secondly, till sufficient number of teachers are trained in interaction analysis, student teachers with CBT may be assigned teaching positions in pairs, so that they can arrange mutual feedback based on actual classroom observations continuously.

The study provides a model to evaluate teacher education programmes in terms of subsequent teaching performance of the student teachers and link it to pupil performance, which is the ultimate goal of teacher education. The design of the evaluation models of teacher education may be conceived as per needs, but here is an attempt to evaluate a part of the teacher education programme—student teaching. Turner (1971) and Rosenshine (1971) also stress the need for this type of work to validate our ad hoc teacher education programmes.

Teaching : The present study helps in teaching in two ways. Firstly, it tells the teacher how to analyse and modify their teaching behaviour, and secondly, it provides a configuration of teaching behaviour patterns that appears to be related to better pupil outcomes. For example, they know that if their behaviour patterns conform to responsiveness, indirectness and flexibility of influence in the classroom, pupil adjustment improves. In conjunction with other 'process-product' studies reviewed earlier, this contributes to the knowledge of teaching effectiveness.

Research on Teaching : The study has provided some knowledge about improving student teaching practices and teacher effectiveness to a limited extent. Some anticipated expectations from future research are natural.

The present study touches only very limited aspects and even exhaustive reviews on research on teaching appearing in the volumes

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of *Encyclopaedia of Educational Research*, volume of *Reviews of Educational Research*, *Handbook of Research on Teaching*, and reviews appearing in other publications reveal that we have touched only a fringe of this complex problem. Concerted and systematic attempts will have to be made to improve teaching. Some of the problems and directions of research are indicated below.

1. This study tried out one strategy of CBT as a means of developing target teaching behaviour patterns. Improvement in CBT to increase its effectiveness further either by way of economising the efforts and resources to be expanded in the process, or by way of developing more broad based and insight based teaching behaviour in the teachers, should be developed and tried out.
2. Systematic studies to evaluate effectiveness of the prevalent programmes of teacher education in terms of ultimate outcomes as envisaged in this study may be taken up by various agencies. This will provide data for improvement of the existing teacher education programmes.
3. This study and the studies reviewed earlier have neither explored nor identified all the relationships between teacher behaviour and educational outcomes. Probably, more correlational studies generating new hypotheses and controlled experiments to validate or reject the hypotheses will have to be taken up. In this study instructional content, instructional objectives and instructional materials could not be controlled in the second phase. Further studies may be attempted controlling these to gain further insight.
4. The present study had teacher as the sampling unit and adjustment for initial ability was made through analysis of covariance. It will be worthwhile to initiate a few studies based on pupil sampling on the basis of their ability and study the classroom interaction patterns. This may provide further insight into the problem.
5. This study used 'low inference' level variables of classroom interaction. Rosenshine and Furst (1971) point out some promising results from studies using 'high inference' level variables also. It will be worthwhile to include both types of variables

in some studies and see the relative effectiveness of the two.

6. This study assumes relationship between classroom behaviour of teachers and pupil outcomes to be linear. How far the assumption is valid? Soar (1969) shows possibility of the relationship to be curvilinear. More studies are needed for testing the assumption of linear relations between teacher behaviour and pupil outcomes.

These are some of the problems, by no means, exhaustive. Imagination and insight of the individual research worker will give birth to efficient studies and enrich the area.

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A Cybernetic Model of Learning and Performance

C.L. Vishen

The author has analysed learning performance in terms of cybernetic variables. The purpose of building up this model was to work out a learning activity system that could self-generate, self-direct, self-control and self-evolve the learning process.

The present paper is the materialisation of a long drawn attempt on the part of this researcher to analyse learning performance in terms of cybernetic variables. The different cybernetic variables used are:

1. Effort that a learner generates.
2. Feedback that a learner gets to the effort generated.
3. Stimulus uncertainty to which the learner is exposed during the learning process.

Feedback has been analysed in terms of the human factors that were found to feed and sustain human activity. The model presents a relationship between different variables involved in human performance, and at best, presents a human engineer's point of view about the operational organisation of human learning activity system. The model is essentially an empirical one and has been built over two years (1970-72) in real life situation of an American classroom where the present investigator was working as a participating teacher. During the first year of experimentation, the different

feedback factors got identified and during the second year the model was validated against further experimentation. In building up this model an attempt was made to build up a teaching system that could stand independent of the facilities that modern American sophisticated educational technology provides. The investigator constantly kept in view the typical Indian school, and the ordinary non-resourceful teacher so commonly found in an Indian school. The purpose of building up this model was to work out a learning system that could self-generate, self-direct, self-control and self-evolve the learning process.

HYPOTHESIS

$$L \propto \frac{EF}{H(S)}, H(S) \neq 0$$

where

$$F \propto \frac{A, A', I, R}{T}$$

Where further

$$A = f(A_G, A_I, A_C, A_R, A_S)$$

$$A' = f(S, S', R', F')$$

$$I = \phi(q, q', r, s)$$

$$R = \theta(Q, O')$$

The symbol 'α' in the above model is only a dependence relation ship. It has the same connotation as in the Boyle's and Charles law of Gasses:

$$\text{Volume of a gas} \propto \frac{\text{Temperature}}{\text{Pressure}}$$

Meaning of Symbols

L = Learning

H(S) = Stimulus uncertainty

A = Awareness

I = Interaction

T = Time

A_G = Goal awareness

A_O = Correctness awareness

A CYBERNETIC MODEL OF LEARNING AND PERFORMANCE

A_s	=	Self awareness
R'	=	Sense of responsibility
F'	=	Freedom to perform
q	=	Quality of interaction
q'	=	Quantity of interaction
r	=	Interactional relationship
s	=	Interactional setting
Q	=	Quality of reward
Q'	=	Quantity of reward
E	=	Effort
F	=	Feedback
A'	=	Autonomy
R	=	Reward
A_i	=	Interaction awareness
A_R	=	Reward awareness
S	=	Security
S'	=	Stability

Definitions and Delimitations

1. *L=Learning performance.* For the purpose of present research, learning activity included:

- (i) Forming mathematical concepts and the ability to integrate these concepts inferred through problem solving capabilities.
- (ii) Developing mathematical skills.
- (iii) Memorising mathematical formulae.

Mathematics to which experiments in this project relate was of the High School level. Measurement with respect to learning achievement was made with the help of the formula:

$$L=X_Q \left(\frac{\sum_{i=1}^n X_i/n + 1}{2} \right)$$

where X_Q stands for the quizz score

$$\text{and } \sum_{i=1}^n X_i = X_1 + X_2 + X_3 + \dots + X_n$$

For the purpose of this research

$$n = 6$$

and

$$X_1 = \text{Daily participation score}$$

- X_1 = Home assignment score
 X_2 = Seminar score
 X_3 = Project score
 X_4 = Critical or creative work score
 X_5 = Attendance score

The students were independently assessed on the variety of learning performances as indicated by different X 's.

2. $E=Effort$. A learner makes two kinds of efforts, viz., exteroceptive effort and proprioceptive effort. Exteroceptive effort is externally directed and controlled. Such effort is involved when, for example, a learner simply copies the solution of a problem from his friend's notebook or when he simply copies down a page from a book. Proprioceptive effort is internally directed and controlled. Such effort is involved when, for example, a learner tries to solve a problem himself without much external aid or when a learner tries to make notes from a book in his own words.

Under heavy externally directed aids, a learner generates exteroceptive effort only and when such aids are withdrawn proprioceptive effort begins to get generated.

For the purpose of the present research " E " stands for proprioceptive effort and it was realized by :

- (i) Leaving the students to their own resources.
- (ii) Letting the students make difficult problems to be solved by other interested students.
- (iii) Making the students to write small projects in areas of their interest and discuss them in the class.
- (iv) Letting the students become creative in many ways within the students possibilities and potentialities.

" E " was measured intuitively and no rigorous method was used for measurement of " E ". A series of different experiments was designed involving increasingly different amounts of " E ".

3. " F "= $Feedback$. The behaving organism considered as a feedback control system has three components in its behaviour :

- (i) It generates its own activity towards its target.
- (ii) As the activity towards the target is generated, it detects its own error.
- (iii) As the error has been detected it tries to redirect its course.

Thus, any feedback system starts with an activation towards the goal. For the purpose of this research, feedback is related to such human factors that are vital for the self-sustenance of a human activity. The different human feedback factors as identified in this research are:

Awareness (A), Autonomy (A'), Interaction (I), and Immediate Reward (R/T). A brief description of these factors is given below:

(i) *Awareness (A)*

Central to the feedback control is the awareness of one's performance in relation to one's goal. A learner sets his own goal, initiates movement towards this goal and then notes the error of his movement in relation to the goal. This precise detection of error helps him to readjust and redirect his further movement. Unless the learner is aware of the results of his movements in relation to the goal, he has no way to regulate, coordinate and control his own activity. When this awareness is built into machines they start behaving like life with respect to purposefulness of behaviour. In electro-mechanical systems it is the feedback loop that keeps the system informed about the result of its activity in relation to the goal. In human being this feedback comes from the different senses. Thus we have visual feedback, auditory feedback, tactual feedback, etc.

Awareness with respect to humans is of different types. The present researcher identified these different types as:

Goal Awareness (A_G)

Interaction Awareness (A_I)

Correctness Awareness (A_C)

Reward Awareness (A_R) and Self Awareness (A_S)

Each of these Awareness's are explained below:

(a) *Good Awareness (A_G)*. Goal Awareness is the awareness that a behaving individual has with respect to his own self-assigned goal. The goals are self-assigned by an individual according to his own level of aspiration and capability.

In the present research a learner fixed his own goal in terms of

the grade he thought he was capable of getting and then every time watched how far away he was from the goal. The goals were pre-assigned in a rank book in terms of grades A, B, C, D and a certain specific number of questions was to be done in the class, and at home to get any particular grade in "Daily participation" and in "Home assignment" respectively. Again a certain level of performance was recorded in seminars and in independent project work, to get particular grades in these areas of performance.

(b) *Correctness Awareness* (A_C). Correctness Awareness in the awareness that a learner has with respect to the correctness of the steps he takes towards the solution of the problem. A learner generates his learning activity and constantly wants to remain aware of the correctness of his activity towards the solution of a problem. Continuous correctness awareness with respect to the movements towards a target when fed into machines kept machines rightly monitored on the correct track.

(c) *Reward Awareness*. Reward Awareness is the awareness that a learner has about the reward that he is expecting to get after completing the learning task. In the classroom setting, Reward Awareness was taken care of by firstly forming rules about what unit of work carries how many credit points and then constantly exposing to the learners rank book which contained a record of day to day student performance.

(d) *Interaction-Awareness* (A_I). Interaction-Awareness is the awareness on the part of a learner about his performance in relation to other members of the group. Since learner is a social being, he constantly relates himself to other learners with respect to his performance.

In the classroom setting the interaction was taken care of by regularly exposing the student-rank-book to the students so that the learner could compare his own cumulative performance with other learners.

(e) *Self-Awareness* (A_S). Self-Awareness is the awareness that a learner has about his learning activity in relation to his own previous performance. Under Self-Awareness a student constantly relates himself to himself.

In the classroom setting rank book was daily exposed to the

students and each student would, besides other things, try to know if he is progressing well in relation to his previous performance.

Thus, a student who would be ranking high in the class would make such expressions as: "though I am doing well as compared to other student, but as compared to myself my progress is poor."

Again some other student ranking low in the class would express: "though I am doing very poorly as compared to other students but as compared to myself I am progressing well."

The present thesis identified five different kinds of awareness, viz. Goal-Awareness (A_G), Correctness-Awareness (A_C), Interaction-Awareness (A_I), Self-Awareness (A_S) and Reward-Awareness (A_R).

Awareness is expressed as a function of these different Awareness elements and this is symbolically expressed as $A=f(A_G, A_C, A_I, A_S, A_R)$.

The present thesis does not however work out the nature of 'f'.

Under experimentation the different A's were deliberately manipulated with respect to their being present or absent and the effect on learning performance was noted.

No rigorous methods were used to measure the different A's.

In one experiment the goal in the form of grades A, B, C, D, were assigned after the performance was over and in another experiment the goals were pre-assigned on the rank-book and the students were allowed to constantly be aware of their performance in relation to their pre-assigned goal.

Thus, under the conditions when goals were post-assigned the factor (A_G) was absent and under the condition when goal were pre-assigned and exposed to the students, the factor (A_G) was present.

Similarly other A's were manipulated with respect to their presence or absence.

(ii) *Autonomy (A')*

A behaving individual wants to be self-governing. He wants to initiate his own movements and direct his own movements towards regulation, coordination and control. Autonomy implies provision of such conditions that an individual becomes capable of self-generating, self-directing, and self-coordinating his own activity.

The present research identified the following factors as crucial to Autonomy:

- (a) Security (S).
- (b) Stability (S').
- (c) Freedom to perform (F').
- (d) Sense of responsibility (R').

A brief description of these factors is given below.

(a) *Security (S)*. Security is related to the mental health of a worker. A student feels secure when the teacher sets up a full transference with the student. The teacher should appear as friend and earnest well-wisher of the student. The teacher's presence should inspire confidence in the students. Security could be realised in the classroom when the teacher remained permissive and tolerant towards the students' behaviour. The teacher came down to the level of the student and tried to understand students' behaviour from their point of view. Student-teacher relationship was based on love rather than fear. The teacher controlled by silent persuasion and integration and not by coercion.

(b) *Stability (S')*. If a learner be considered as a system, then he will be said to be stable if and only if he does not get totally lost when exposed to new learning experience.

A system is said to be stable if it is not disturbed everywhere.

This research recognised two kinds of stabilities, viz., student controlled stability and the teacher controlled stability. The student controlled stability falls under the Autonomy factor of the present model. The teacher controlled stability falls under the H(S) factor of the model.

In the present project, under autonomous conditions, a learner chose his own material in accordance with his own capabilities and potentialities and then went about handling this material.

'Stability' was not measured rigorously. The effect on learning performance was noted under conditions when the "stability" factor was present and when it was absent.

(c) *Freedom to perform (F')*. Freedom to perform is crucial to Autonomy. The individual should be able to perform in his own way according to his own capability and potentiality and in the manner he thinks best. His thinking may be manipulated, but what-

ever he does should have the approval of his understanding.

With respect to present research "Freedom to perform" was realised by letting students make their problems and solve them in the way they thought best.

Working independently on self-chosen projects was another way of realising the factor "Freedom to perform".

No rigorous methods were used to measure "F". The effect of "F" on learning was observed by its presence or absence.

(d) *Sense of Responsibility (R')*. For the purpose of this research, sense of responsibility was realised by letting the students to propose a question for the whole class and conduct the class with respect to that question and give grades to other students. To further promote sense of responsibility, the students were asked to conduct seminars and then to grade themselves according to commonly accepted consensus.

The effect of 'R' on learning performance was observed by its presence or absence.

The present thesis identified four parameters of Autonomy, viz., (a) security (S), (b) stability (S'), (c) freedom to perform (F'), (d) sense of responsibility (R'). and autonomy factor was expressed as a function of these parameters.

Symbolically it was expressed as $A' = \phi(S, S', R', F')$. The nature of ϕ was not determined.

(iii) *Interaction (I)*

The present thesis recognised the importance of student interaction in learning situation.

The different parameters of interaction as identified by the present research were: (a) Quality of Interaction (q), (b) Quantity of Interaction (q'), (c) Relationship among the people who interact (r), and (d) International Setting (s).

A brief description of these is as follows:

(a) *Quality of Interaction (q)*. Quality of interaction involves the quality of people that interact and the level at which interaction takes place. The factors involved under quality of people would be age, sex, intelligence, previous background, social status, etc.

Under the level of interaction come such factors as: Who in-

teracts with whom. Thus student-student interaction would be different from teacher-student interaction.

Again in the case of student-student interaction care was taken to note the capacity in which one student interacted with the other. Whether the interaction was at equal level or as superior to inferior or inferior to superior level.

(b) *Quantity of Interaction*(q'). Quantity of interaction involves the number of people who interact and the number of times interaction takes place over time.

(c) *Interactional relationship* (r). This factor is very important. Though friendship among people increases as a result of interaction, friendship is also a prerequisite to any interaction. Two hostile individuals do not interact. They try to shun each other.

Again, interaction in a family is different from the interaction in an office or factory or a classroom because of the different nature of the relational structures among the interacting members.

Interaction under an autocratic relational structure is different from the type of interaction obtainable under a democratic relational structure.

With respect to the present research democratic friendship relational structure was obtained. The teacher identified himself as one among the students and evolved himself as a leader. Leadership chances with respect to the students were promoted by creating conditions that facilitate such behaviour.

(d) *Interactional setting*. Setting is determined by external aids like music, dancing, drinks, etc., and organization of interaction relationships like competition, cooperation, etc. In social gatherings the setting is that of music, dance, drinks, etc. In the classroom the setting is either cooperative or competitive or cooperative-competitive, etc. This project was related to a cooperative-competitive setting. Interaction in the classroom was generated by organizing a game, a discussion group, or dividing students into small groups to be engaged in interdependent projects.

No rigorous measurement was made with respect to the interaction factor. Interaction was qualitatively treated and promoted or discouraged by creating conditions appropriate to obtaining such state of interaction. For the purpose of present research, inter-

action was promoted by allowing the students to talk to each other about the problem, letting them form themselves into discussion groups or into competing groups. "Interaction" among students got discouraged under lecture method of teaching.

It is important to note that interaction (I) and Interaction Awareness (Δ_I) are two different things. In the present research Interaction Awareness was generated by maintaining records of how students performed in relation to other students and exposing these records constantly to students. On the other hand Interaction itself was generated by organising classroom behaviour with respect to learning interaction.

The present thesis identified four parameters of interaction, viz., Quality of Interaction (q), Quantity of Interaction (q'), Interactional Relation (r), Interactional Setting (s), and Interaction factor was expressed as a function of these parameters. Symbolically the same is expressed as : $I = \psi(q, q', r, s)$.

The present paper does not try to investigate the nature of ψ . Further q , q' , r , and s were qualitatively treated.

(iv) *Immediate Reward (R/T)*

Reward may be tangible or intangible. Tangible rewards were administered in the classroom both qualitatively as well as quantitatively.

The qualitative tangible rewards were administered in the form of grades A, B, C, D awarded after completing a certain assigned task.

The quantitative tangible rewards were administered in the form of credit points given after a certain unit of work was completed.

Intangible rewards also have qualitative and quantitative aspects. The intangible rewards were administered in the form of a pat or praise and appreciation given after the approved action was completed.

It is important to note that Reward and Reward Awareness are two different things. Reward Awareness was generated by framing rules in advance about what unit of work carried what quality and quantity of reward and then maintaining records, of the rewards

earned, in the form of rank books which were constantly exposed to the students.

(v) *Stimulus Uncertainty H (S)*

II(S) stands for the amount of uncertainty in the stimulus to which a learner is exposed during one single unit of activity.

II(S) is an index of stability. For stability of a system it is important that only a finite number of elements are disturbed at one time. A stable system is not everywhere disturbed. H(S) represents teacher controlled stability and depends entirely on the teacher with respect to its handling.

The student controlled stability is involved in the Autonomy (A') factor of the model.

For the purpose of this research H(S) was varied by varying the degree of complexity of the learning material. Greater the complexity of the material, greater the amount of H(S) to which a learner was supposed to be exposed. No rigorous method was used for measuring H(S). It was measured intuitively. Exposure to stimulus uncertainty was manipulated under different experimental conditions.

EXPERIMENTAL DESIGN

Subjects

The subjects were broadly divided into three groups: Freshmen studying Algebra I, a heterogeneous group of juniors and seniors studying Algebra II, and a heterogeneous group of juniors and seniors educationally backward and studying Maths. II. The Algebra II group was a college-bound group. The Maths. II group was a non-college-bound group.

The college-bound group was generally more serious towards the subject matter than the non-college-bound group. Maths. II students studied maths. because it was a state requirement to have two years of maths.

The number of students in different groups ranged from 16 to

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25. Maths. II had 18 students in it; Algebra I and Algebra II groups had 25 to 30 students in each group.

All the students belonged to the Branford community and were students at Branford High School.

The different experimental variables were first introduced to the different groups one by one and later withdrawn one by one and each group was compared to itself with respect to its performance.

Controls

Each group was compared to itself with respect to performance as different variables were introduced or withdrawn. This implies that all such variables as age, intelligence, the teacher, etc., were constant in each group throughout the series of experiments conducted on that group.

Thus, Maths. II group was the same during Experiment I, Experiment II, Experiment III.....with respect to the above-mentioned factors.

Independent Variables

The different variables of the cybernetics model such as Effort, $H(S)$, A. A'. I. R. and T were introduced one by one in each group in a series of experiments. These variables served as the independent variables. The same variables were later on withdrawn one by one and the effect of withdrawal of a particular variable on learning performance was measured.

Dependent Variables

The dependent variable was the learning performance under different conditions of treatment.

RESULTS

T A B L E¹

*Performance on Daily Credits under Different Experimental Conditions
of All the Groups Taken Together.*

Experimental variable manipulated (cumulative)	Problems solved per day per student in the classroom	Test of significance between two successive variable manipulations V_{n-1}/V_n (unless other wise indicated)
	Mean	S.D.
1. Traditional teaching	4	2.7
2. Introduction of immediate reward	8	2.6
3. Introduction of awareness factor	11	2.5
4. Introduction of H(S) factor	14	1.4
5. Introduction of autonomy	13	1.6
6. Manipulation of interaction (cooperation)	14	.5
7. Cooperative competition	17	1.2
8. Pure competition	20	2.5
9. Dropping pure competition. Awareness further manipulated by preassigning goal locations	18	1.3
10. Dropping immediate reward	8	1.5
11. Dropping H(S) only	6	2.3
12. Dropping autonomy	17	1.7

¹ There are seven such tables. Only one table has been presented here.

² However, under these conditions (Autonomy) learning was more meaningful and creative

³ The experience was nerve-breaking for the student under condition 8

CONCLUSION

It was evident from the results that immediate tangible and intangible rewards were very essential to motivation. An individual would not participate or interact unless some such result was in view. He interacted with other people to get satisfaction of such needs as were related to his ego and sense of affiliation.

Immediateness of reward as compared to delayed reward was significantly effective with respect to performance.

The time factor was important until the stage of commitment was reached. Once the commitment stage was reached, extrinsic rewards became meaningless and the performance itself became impelling to the individual and spurred further performance.

Immediate tangible and intangible rewards speeded up the process of participatory activity, leading to better efficiency and in time to commitment.

Reward was very crucial to performance. All such factors as autonomy, interaction, awareness and effort were not realizable without reward. The moment immediate reward was introduced, coupled with other factors, the classroom at once got converted from an inactive, dull and boring state to a very interesting, active and satisfying state.

Interaction with other members of the group was very satisfying to the behaving organisms. Performance under proper social interactions tended to be more efficient. An individual did not get feedback only from his own movements, but also from the movements of the other people in his group.

Competitive interaction made the learner more productive but tense.

Cooperative interaction made the learner feel relaxed although less productive.

Cooperative-competition was the best form of interaction.

Interaction invoked the group dynamic principles and made classroom situation more human, pleasant, creative, and interestingly meaningful both to the teacher and to the learner. Teaching and learning became fun.

Stability was very crucial to performance. There were two

ways through which stability was attained. One way was teacher-organized stability which was akin to programming and was attained through the manipulation of II (S). The other stability was learner-organized where the learner scanned through a host of material and picked what was manageable to him. In the teacher-organized stability the element of proprioceptive effort was very small as compared to the effort involved in the learner-organized stability.

The learner-organized stability was a part of the Autonomy factor and was realized through the work that the student did in writing a project or in making his own problems to challenge the other students in the group.

Learner stability was achieved through the learner's ability to perform. The moment the learner lost control of his own movements he was no longer able to regulate, coordinate and control his own activity.

The autonomy factor coupled with reward for performance gave significant increase in performance. Autonomy alone without reward did not work because there was no motivation to exercise Autonomy. When the control was fully shifted from the teacher to the students, the results were highly encouraging. With an increased degree of Autonomy, the creative talents of the individual seemed to get liberated and the process of involvement and commitment seemed to speed up. Autonomous conditions were found to contribute both to stability and to self-actualization.

Under conditions of autonomous work, the learner did not become very dependent on extrinsic immediate reward. They generated within themselves an intrinsic reward generating mechanism.

Autonomy and Awareness of one's performance were found to be essential to the realization of self-directing and self-controlling human learning systems.

Awareness of one's performance in relation to the goal was found to operate in four ways:

- (a) The learner wanted to know if he was correct in solving a problem; if not, where exactly was he wrong.
- (b) The learner wanted to constantly compare his performance with his own previous performance and with the way he should have performed.

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(c) The learner also constantly wanted to compare his performance with other members of the group in relation to the goal. In the classroom situation the goals were the grades that the students wanted to earn at the end of the course.

(d) The learner was always reward conscious in relation to his performance. In fact being reward conscious was very crucial for his motivation.

Making students constantly aware of their performance with respect to:

- (i) The self-assigned goal
- (ii) The anticipated reward
- (iii) The correctness of the solution
- (iv) The other members of the group
- (v) Their own previous performance

enhanced the student activity tremendously and kept it self-sustained.

6. Effort directed and controlled intrinsically was found to contribute to inbuilt learning that was resistant to forgetting and distortion.

Proprioceptive effort could not be generated unless the learning became meaningful to the learner. The more meaningful the learning the more effort was generated and as more effort was generated, learning became more meaningful. Once the proprioceptive effort was generated feedback to that effort was very essential to keep that activity sustained.

Learning effort became self-sustaining under such human factors as Autonomy, Awareness, Interaction, and Immediate Reward. To start with, generation of effort heavily depended on Immediate Reward.

The importance of proprioceptive effort in relation to learning can never be overstressed. Learning in fact could never take place if the effort was not intrinsically generated.

Implications of the Model

In this thesis cybernetics was defined as the science of inbuilt behaviour control. Consistent with this definition the following

learning model was proposed:

$$L \propto \frac{EF}{H(S)} \quad H(S) \neq 0$$

Where

$$F \propto \frac{A.A.I.R.}{T}$$

This model involves different information and feedback variables.

The feedback factors—awareness, autonomy, social interaction, and immediate reward—are the different human needs that make the human activity self-sustaining.

There are two things that have to be recognized at the outset:

(i) sustaining human activity, and (ii) making the human activity self-sustained.

Human activity may be sustained by external aids that reinforce the human activity.

Making human activity self-sustained requires a different kind of mechanism.

Developing self-sustenance is a matter of deeper change in the central neural structures that constantly grow to make the effect of that change realizable.

The proposed model will not be said to have been realized in practice unless the internalization of activity-sustaining mechanisms takes place and the individual becomes independent of the external reinforcement mechanisms.

This model recognises the growth of unconscious structures that impel, direct and control activity. The extrinsic reward mechanisms are an aid to the growth of such structures; but once such inbuilt control mechanisms have grown and been stabilized, the behaving individual becomes independent of extrinsic rewards or reinforcements. An individual performs because he wants to perform. Need to perform becomes sufficient motivation. The model restores a human being to a human dignity and does not treat him like a pigeon or a rat in a cage. While recognizing the importance of immediate reward with respect to performance, it grants, the behaving individual an autonomy suitable to his behaving mechanism. A human being is not thought of only as a set of muscle structures used to fit pieces together on an assembly line, not only as a set of brain neurons capable of building up logical structures in a science lab, but also a

whole lot of emotions for the satisfaction of which social interaction is very essential. It attempts to make human use of human beings.

The model does not only concern itself with productivity but also with the mental health of the performer. The model does not recognize the homeostatic principle in psychological behaviour space. The individual has been looked upon as a homokinetic being who constantly needs to perform and who will continue to perform in a desirable direction provided the proper environmental facilities prevail.

The human being no doubt progresses from equilibrium to equilibrium. The equilibrium is at best only limiting, and each new equilibrium state is different from the previous equilibrium state.

The model recognizes the evolutionary nature of human behaviour and fully supports the Gestalt idea that learning is a constant process of forming new gestalts, each gestalt being better, (i.e., less uncertain) than the previous one.

The model refuses to look upon a behaving individual as a servosystem, but considers him as an essential unit in the coordination, control and regulation of that system. Thus it will advise a Factory manager to make a worker a partner in the policy and decision-making. A decision to which the factory worker is a party will be carried out by him with full responsibility.

The model suggests that reward is one of the factors that feeds human activity. Reward alone is not everything. There are many other things for which humans may generate activity. There exists a multiplicative relationship between such factors as Awareness, Autonomy, Interaction and Reward; if a single factor becomes zero the value of $F=0$.

In real world situations none of these factors can ever become zero. This explains the continuance of human activity even under the worst conditions.

Specifically, with respect to the learning situation the model implies:

1. Learning depends on effort directed and controlled from within. This is analogous to "learning by doing" and is implied in the B factor of the Model.
2. Learning effort once generated must receive feedback for its

sustenance. Learning effort feeds on Awareness, Autonomy, Interaction, and Immediate Reward. Taking note of these factors is a recognition of the importance of human designs in learning behaviour.

3. Learning is an inverse function of stimulus uncertainty. The learning progresses smoothly when the learner is exposed to small doses of uncertainty. This is analogous to the programmed learning principle.

The proposed model is a unified model of learning. It combines the reinforcement principle of S-R theories, the organization principle of the Gestalt theory, the group dynamic principle of the field theory, and the awareness principle of the current cybernetic theories.

The proposed model is also a general purpose model. It explains the different forms of learning where deliberate and organised effort is involved. Whether it is concept learning, skill learning, verbal learning, or problem solving, motivation to learn is essential for all.

The proposed model combines motivation with effort and details the different needs which when manipulated impel humans to perform.

The model has tremendous implications for industry where performance at a high production level is always the main problem.

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A Study of the Socio-Cultural Stratification of Need Achievement in Three Linguistic Groups

Manju Mehta

This investigation was undertaken to study the quantitative differences in Need Achievement between three linguistic groups—Sindhi, Punjabi, Hindi—and to determine the factors in the socialization process that are related to differential Need Achievement.

Empirical studies of need achievement, carried out in various societies, reveal cultural differences (McClelland and Friedman, 1952; Child *et al*, 1958). The findings point towards the universally agreed conclusion that the 'cultural pattern', 'ethos' or the 'themes' are important in shaping the personality. These are instrumental in giving the personality its cultural uniqueness.

Indian culture has many sub-cultures. Every linguistic group has different culture of its own. They differ in the ways of life, values, traditions, etc. Some of them are more upwardly mobile, more business-oriented, more sensitive to innovations and future-oriented. On the other hand, some are relatively less upwardly

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mobile, less business-oriented, less sensitive to innovations and more traditional. In certain sub-cultures there is emphasis on 'doing', whereas in certain others the emphasis is on 'being'. In all these sub-cultures, Sindhis and Punjabis can be taken as representative of the first type and sub-culture of Hindi-speaking people can be taken as representative of the latter.

Empirical studies have shown that mobility is associated with need for achievement (Litting and Yercaris, 1965). It has also been found that modernisation, sensitiveness to innovations and traditionalism are related to achievement motivation.

Empirical investigations of Winterbottom (1953), Rosen (1959), McClelland (1955) and others have shown that socialization process in early childhood is a key to the development of achievement motive. Various social groups differ in the level of achievement motive due to the differences in child-rearing practices and social learning processes. Rosen and D'Andrade (1959), found that greater stress on independence and achievement in situations involving standards of excellence and warmth-oriented disciplinary methods contribute to higher need achievement in middle class boys. Value differences have also been found related to differential achievement motivation (Strodtbeck, 1958). Greeks and Jews who are more achievement motivated, have more achievement facilitating values than Italians, French, Canadians and Negroes.

PURPOSE

The purpose of present investigation is to study the quantitative differences, if any, in the amount of need achievement present in three Indian linguistic groups, viz., Sindhi, Punjabi and Hindi, and to find out the factors in socialisation process which are related to differential need achievement.

HYPOTHESES

Following hypotheses were raised for testing in the present study:

- (1) The boys in three linguistic groups under study will differ in their level of need achievement. Sindhis and Punjabis will be higher in the amount of need achievement than the boys in Hindi-speaking group of U.P.
- (2) More the amount of n achievement in the group more the mothers in that group will emphasise on—
 - (a) independence and mastery at an earlier age;
 - (b) warmth-oriented disciplinary methods;
 - (c) achievement facilitating ethical education; and
 - (d) having achievement facilitating value orientation.

METHOD

Sample

Forty higher secondary school boys belonging to each linguistic group were randomly selected to study the level of n achievement in the three groups. The schools were (1) Poddar Multipurpose Higher Secondary School, and (2) Darbar Higher Secondary School from Jaipur, Rajasthan. For collecting data on socialisation process, ten mothers from each linguistic group under study, were randomly sampled. The only requirement they had to fulfil was that they should be mothers of at least one boy aged 5 to 10 years.

Procedure

The need achievement was measured by thematic apperceptive measure, using following four TAT cards—1, 8 B.M., 17 B.M. and 14. The use of these cards was suggested by Shrivastava and Tiwari (1967). The test was administered to the Ss following the standard procedure described by McClelland, *et al* (1953) in a group setting. The stories written by the subject were scored according to McClelland *et al*'s scoring manual for the achievement motive (in Atkinson, 1958), by both the investigator and the supervisor separately. The initial inter-scorer reliability was .78. Later the cases of disagreement were discussed till 100% agreement was reached. Final scores were those on which both the scorers agreed.

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For getting information from mothers regarding socialisation processes, an unstructured interview schedule was prepared in Hindi, in which separate questionnaires were prepared to measure: (a) mother's standards of age in training independence, (b) mode of reward and punishment, (c) achievement related value orientation, and (d) mode of ethical education.

RESULTS AND DISCUSSION

The Amount of Need Achievement and Linguistic Groups

To test the hypothesis about group membership and amount of *n* Achievement present, the data obtained on TAT was statistically analysed. Table 1 shows that the results confirm the hypothesis.

TABLE 1*
Mean n Achievement in Linguistic Groups

<i>Linguistic Groups</i>	<i>N</i>	<i>Mean n Ach</i>	<i>'t' Value</i>	<i>P</i>	
A Hindi (U.P.)	40	1.5	A and C	2.49	<.02*
B Sindhi	40	3.07	A and B	1.14	<.05*
C Punjabi	40	3.42	B and C	.29	N.S.

* The values are significant in the predicted direction (one-tailed test)

The mean *n* achievement of Hindi-speaking Ss was 1.5 and of Sindhi Ss 3.07. The two means differ significantly in predicted direction. The mean *n* achievement of Punjabi Ss was 3.42, which also differs significantly from the mean of Hindi-speaking boys. The difference between the means of Sindhi and Punjabi Ss was not statistically significant. All these results confirm the hypothesis and show the socio-cultural influence upon the amount of need achievement.

Differences in the Socialization Process

(a) *Standards of age in training independence and mastery.* Table 2 shows that the results on the scale to measure mothers' standard of age, confirm the hypothesis that more the amount of need achievement present in the group, more the mothers in that group will emphasise the need for training independence and mastery at an earlier age. If we compare the means of Hindi (U.P.) and Sindhi groups, nine out of 10 mean differences were in the direction as predicted. Four of these were statistically significant. (Item Nos. 1, 2, 4 and 9 't' values were $1.87 < .05$, $4.57 < .005$, $2.65 < .01$, and $1.93 < .05$ respectively).

TABLE 2
Mean Standards of Age in Training Independence and Mastery

Item No.	HINDI (U.P.) GROUP		SINDHI GROUP		PUNJABI GROUP	
	N.	Mean	N.	Mean	N.	Mean
1.	10	5.8	10	4.9	10	5.2
2.	10	6.4	10	4.8	10	5.3
3.	10	12.7	10	11.6	10	12.2
4.	10	20.3	10	10.0	10	19.2
5.	10	10.2	10	9.2	10	9.2
6.	10	4.5	10	4.3	10	4.1
7.	10	6.9	10	6.8	10	5.9
8.	10	14.0	10	14.2	10	13.9
9.	10	8.9	10	6.2	10	8.2
10.	10	13.8	10	14.3	10	14.5

Comparing the means of Hindi and Punjabi groups, we find that here also nine out of 10 mean differences were in the predicted direction. Two of them were statistically significant. (Item Nos. 2 and 4; 't' values $2.50 < .02$, and $2.36 < .05$, respectively). The mean differences in Sindhi and Punjabi Ss had no fixed direction and none of the difference was statistically significant. The results are consistent with the findings of Winterbottom (1958), and Murlidharan and Topa (1970), who found that the mothers of high need achieving boys make early demand for independence and mastery, than the boys having low need achievement.

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*The Mode of Reward and Punishment (Sanctions)
and the Need Achievement*

Table 3 shows that the results about mode of reward and punishment did not support the hypothesis that more the amount of need achievement present in the group, more the mothers in that group will emphasise on the warmth-oriented discipline, i.e., they will emphasise on using both reward and punishment similarly. According to the principle of variable ratio reinforcement, when the behaviour of reinforcing agent is sometimes rewarding and sometimes punitive than the reinforcing property of that agent will be greater. This notion is supported by a finding of Sears, *et al* (1957).

The results show that mothers in all the three groups are more affectionate and less rejecting to their children. The low level of need achievement in the entire sample of boys under study can be explained on the basis of this finding.

TABLE 3
*Mode of Reward and Punishment Emphasised
by the Mothers*

	HINDI (U.P.) GROUP N=10	SINDHI GROUP N=10	PUNJABI GROUP N=10
<i>Reward</i>			
Physical	7	10	9
Verbal	8	8	8
Object	7	8	6
<i>Punishment</i>			
Physical	5	3	3
Verbal	6	7	8
Object	8	10	9

Note: All the obtained X^2 values are insignificant.

Value Orientation and the Need Achievement

The hypothesis that more the amount of need achievement present in the group, more will be the achievement facilitating value orientation of the mothers in that group is supported. Table 4 shows that all the comparisons between the mothers in three groups in their value orientation are in the predicted direction. The Sindhi and Punjabi mothers have more achievement facilitating value orientation than the mothers in Hindi linguistic group of Uttar Pradesh. The results indicate that larger proportion of Punjabi and Sindhi mothers have artistic, future-oriented and individualistic value orientation than the mothers in the Hindi-speaking group.

TABLE 4
Value Orientation of the Mothers in Three Groups

Value Orientation	LINGUISTIC GROUPS		
	HINDI GROUP (U.P.) N=10	SINDHI GROUP N=10	PUNJABI GROUP N=10
Activistic	4	8	9
Passivistic	6	2	1
Future oriented	6	8	8
Present oriented	4	2	2
Individualistic	3	5	5
Familistic	7	5	5

Mode of Ethical Education and the Need Achievement. The results presented in Table 5 show that the hypothesis that more the amount of need achievement present in the group, more the mothers in that group will emphasise the need for giving more achievement facilitating and less achievement inhibiting ethical education is confirmed.

All the comparisons between the obtained frequencies of the mothers in three groups are in the predicted direction; of these two are statistically significant. Mothers in Sindhi and Punjabi groups reported giving more frequently the achievement facilitating ethical education than the mothers of the Hindi linguistic group. The

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TABLE 5

Observed Frequencies on the Items of Mode of Ethical Education

I. T B M No.	Observed Frequencies			X ² Values and df					
	Hindi (U.P.) Group	Sindhi Group	Punjabi Group	Hindi-Sindhi Group		Hindi-Punjabi Group		Sindhi Punjabi Group	
				X ²	df	X ²	df	X ²	df
1	4	9	9	1.23	1	1.23	1	.05	1
2	6	7	8	.00	1	.07	1	.00	1
3	1	6	4	2.88*	1	.80	1	.10	1
4	3	4	6	.00	1	.12	1	.00	1
5	3	1	1	.25	1	.25	1	.50	1
6	8	6	1	1.00	1	2.72*	1	2.86*	1
7	9	2	1	3.27**	1	4.92**	1	.00	1
8	6	5	6	.00	1	.00	1	.00	1

*P > .05 < .10 in predicted direction

**P < .05 in predicted direction

mothers in Hindi linguistic group reported giving more frequently the achievement inhibiting ethical education.

From the results about the value-orientation and ethical education, it can be said that the three groups differ in their achievement-related values and ethics. The divergent value-orientation and ethical education through the process of socialisation, operate to develop differential amount of need achievement in the members of the three groups.

SUMMARY AND CONCLUSION

The findings can be summarised as follows:

- (1) Sindhi and Punjabi boys are higher in the level of need achievement than the boys in Hindi linguistic group.
- (2) The origin of differential achievement motivation is in psychological factors related to socialisation process. The following factors in socialisation process were found related to differential achievement motivation in three groups:

- (i) mother's standards of age in training independence and mastery;
- (ii) the achievement-related value-orientation of mothers; and
- (iii) mother's mode of ethical education.

The mode of reward and punishment was found unrelated to differential achievement motivation. It was found that mothers in all the three linguistic groups reported employing more reward and less punishment. But it cannot be said that the mode of reward and punishment is not affecting the origin of need achievement in three groups. The low level of need achievement of the entire sample of boys can be explained on the basis of this finding.

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An Investigation into the Area, Type and Extent of Student Participation in the Governance of Teacher-Training Institutions

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This study attempts to explore the area, manner and extent of participation available to students in the governance of teacher-training institutions. The findings are based on responses obtained from 98 teacher-educators and 114 student-teachers from 51 teacher-training institutions.

There are a number of researches in the areas of employees and workers' participation in business enterprises and industries. Investigations bearing upon productivity, supervision and morale by Survey Research Centre, University of Michigan, led Katz to conclude that "workers do better when some degree of decision-making about their job is possible than when all decisions are made for them." Experiments conducted by Bavelas in the plant of Harwood Manufacturing Corporation as reported by French have shown that "the application of skilful democratic techniques of leadership in industrial settings can result in extremely marked increases in group productivity which will persist over long periods of time." Investigations conducted by Tavistock Institute of Human Relations, Michigan Bell Telephone Company and that by Levine and Butler, all support the conclusions reported by Katz and others. Similar conclusions may

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emerge as a result of student participation in the administrative affairs of educational institutions.

But no systematic and objective research is on record in the area of student-participation in the governance of educational institutions. However, in the context of growing student unrest and democratic urge of students the importance of the problem has been recognized, particularly at the university level and there are reports available of a number of committees, conferences and seminars organized by the government and the University Grants Commission to discuss the question of student participation in university decision-making process. In addition to these reports quite a few articles have appeared in the recent past in educational journals and newspapers which have tried to highlight the issue of student participation in university administration. The question of student unrest and student participation has been indirectly dealt with both in the Indian context as well as in the context of countries particularly in the west, in several books that have appeared on the subject during the last decade or so. The increasing frequency of student disruptions of academic routines over the past decade has been quite well charted. But there is no satisfactory explanation of the increased frequency of student unrest and violence of the past few years and it is not known how many students were involved in them. It is observed that disruptions are more frequent in arts colleges and in law colleges than in medical, technological and teacher-training colleges and in missionary colleges. Philp G. Altbach observed important institutional variation in Indian student unrest. He noted the indiscipline is not a problem in the prestigious and well financed institutions of technology and among science students and students in professional institutions.

Why is there lack of student disturbance in the teacher-training institutions? Most of these institutions are not as prestigious as other professional institutes which are better financed and where the per capita expenditure is far more high than in teacher-training institutions. Is the lack of student disturbances due to the students' share of participation in the administrative matters of these institutions or it is due to some other reasons?

The students in the teacher-training institutions are more mature

and they are generally supposed to be more professionally oriented than other university students. Besides, they will soon take on academic and administrative responsibilities in schools they will teach. Therefore, there is a case for their being placed in apprenticeship situation in a teacher-training institution so that they learn to share responsibility and behave as responsible participants in the running of the institution.

India is a democratic country. It is wedded to democratic ideals, but in spite of the demand and the trend to favour the active participation of teachers and students in the decision-making activity of their institution not much is known about the type and extent of opportunity student-teachers are getting to conduct and run the academic and non-academic programmes and activities of their institution. The present study attempts to explore certain facts in respect of student participation in the governance of teacher-training institutions.

PURPOSE

The main purpose of the study was to investigate into the area, type/manner and extent of participation available to students in the governance of teacher-training institutions. Subsidiary purpose was to find out: (1) what according to teacher-educators and student-teachers constituted student participation?; (2) what reasons they advanced for permitting or not permitting student participation; (3) what views/opinions they had about student participation in relation to the area, type and extent of this participation; and (4) whether student participation practices differed in institutions under different administrative control and in different types of institutions.

PROCEDURE

The study comprised content analysis of several reports and research papers dealing with studies on participation of employees and workers in business enterprises and industries, student unrest, indiscipline, student power and student disruptions in university campuses and organisation of a seminar of teacher-educators and

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student-teachers to explore certain facts and opinions in respect of student participation in the governance of teacher-training institutions before a comprehensive eleven-page student participation survey questionnaire and a student participation scale were drafted and used on teacher-educators, student-teachers, office bearers of the students' union and those who did not hold any office in the union to collect facts about student participation practices and their observations and views on these practices.

FINDINGS

The findings of the study are based on the responses obtained from 98 teacher-educators and 114 student-teachers from 51 teacher-training institutions representing 27 universities and a State education department.

A. *What is Student Participation ?*

Social psychologists and workers in business enterprises and industries admit that meaningful participation infuses team spirit, involves a feeling of identification and commitment to the institution for all its activities and for all that it stands for, develops in the participants a sense of belongingness to the institution and provides for actual sharing by them in the making of decisions on policies, programmes and activities.

Some educationists who acted as judges to rate the nine statements used in the study to illustrate instances of student participation on a scale of 'real' or highest level of participation at one end and little participation or no participation at the other end of the scale, seemed to agree with the social psychologists and industrial workers in their interpretation of what meaningful participation means. They rated the nine statements on the scale in the order: H, F, D, G, E, B, C, A and I and indicated that the statement 'H', i.e., 'Students identify themselves with authorities as co-partners and members of a working team in administration of the institution' described participation at the highest level and the statement 'I', i.e., 'Students do

only what they are told to do' described little participation or participation at the lowest level.

Two criteria were used to determine the agreement/disagreement between the judges' and the respondents' (Teacher-Educators—TEs and Student-teachers STs) understanding of student participation. They were: 1. frequency (in per cent) with which a statement was voted as an instance of participation, and 2. pooled ratings/rank positions the statements received.

None of the nine statements was checked as an illustration of participant situation by 100.0% of TE and ST as a group. But all the nine statements were considered as describing situations in which students played participatory role and were graded in order of the level/degree at which they described student participation.

The statements were serially arranged in the order: D, F, G, A, H, I, E, B, and C according to their popularity, i.e., frequency with which they were accepted as instances of student participation and in the order: II, F, D, (I, B, 1, E, A and C) according to preference or importance they received from the respondents. Statement 'D', i.e., 'Policy decisions are made by the authorities but programmes and activities are decided in consultation with students and authorities' was the most popular and the statement 'II', i.e., 'Students identify themselves with authorities as co-partners and members of a working team in the administration of the institution' the most valued interpretation of a participant situation. Statement 'C', i.e., 'Students do not consult the authorities to determine the activities and programmes for themselves' was the least popular and also at the lowest level of the participation scale.

Most of the TEs and STs as a group were either not aware of what meaningful participation involved or were so much accustomed to the traditional running of the institution in which students should do nothing but accept the advice and instruction of their teachers that their understanding and interpretation of the concept of participation was at variance from that of the judges, social psychologists and industrial workers. Correlation between per cent of TE and ST as a group who checked the statements as illustrations of participant situations and the judges' expectation of their (per cent) distribution was not significant (.51).

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The TE and ST as a group agreed with the judges when they expressed their order of preference for the participant situation. Correlation between the judges' ranking of these statements/situations and those of the TE's and ST's as group was significant (.81).

A statement was considered describing student participation by a larger per cent of TEs and STs, but it was not correspondingly accorded as high a rank position as the frequency with which the statement was checked. Similarly an instance was assigned higher rank position on the scale but was not correspondingly voted by as large a number of TEs and STs as the rank position of the statement would suggest.

The TEs and STs agreed with one another in their consideration of the nine statements as indicators of participant situations (correlation .96). But they significantly differed in their preference for placing these statements on various positions on the scale. Correlation (.53) between TEs and STs ranking of these statements was not significant. The STs were more in agreement with the judges than the TEs. Correlation between judges' and students' ranking of instances of participation was .75 (significant at .05 level) and between the judges' and the TEs .566 (not significant). The STs ranking of the statements was in the order: H, F, B, D, E, G, C, and A and that of the TEs in the order: H, D, E, B, A, G, F, I and C.

The ST(O)'s (Student-Teacher Office Bearer of the Students Union) and the ST's (Student-teacher holding no office in the union) also differed with one another in their preference for these statements (correlation .38). But they agreed when the incidence with which the statements were understood to describe participant situation was considered (correlation .96).

The understanding/interpretation of what student-participation constitutes did not generally vary in institutions under different administrative control and because of lack of any systematic pattern of variation in its interpretation resulting from variation in types of training institution, the hypothesis of differential understanding of participation in different types of institutions could neither be accepted nor rejected.

B. Reasons for Permitting Student Participation

Eleven reasons were advanced for allowing student-teachers to participate in the governance of their institution. These reasons were: (A) 'Students are mature, experienced and responsible', (B) 'Student's interest in the institution is vital to him and his successors', (C) 'Students are vehemently demanding such participation', (D) 'Dividing line between staff and students is arbitrary and not worthwhile from educational standpoint', (E) 'If students are to assume responsible positions in society they must exercise responsibility in training institution', (F) 'Rigid and authoritarian structure around scholarship is not conducive to educational growth and process of free enquiry by student', (G) 'Learning is a two-way process and students should work as co-partners with the staff in the learning process, instead of remaining passive recipients of handed down knowledge which they are not fit to question', (H) 'By participating students acquire responsible creative attitude to scholarship', (I) 'If students are given opportunity to discuss with their teachers the administrative matters, they understand and appreciate better how a training institution functions', and (K) 'It is in the fashion these days'.

Each of these reasons was suggested by at least 11.6% of the respondents. No reason was put forth by 100.0% of the respondents. Most universally accepted reason/justification was the reason 'E' followed by G, H, (A&I), B, F, J, D, C and K in that order. These reasons were assigned more/less as high a rank position for their preference as the frequencies with which these reasons were advanced. Correlation between popularity of these reasons and the rank positions they were assigned was .77 (significant at .01 level).

The differential popularity of these reasons and the order of importance given to them suggested that respondents were conscious of the positive implications of democratic functioning of training institutions primarily because the student-teachers were relatively more mature, experienced and responsible and because at this stage dividing line between staff and students might not be worthwhile from educational standpoint.

The TEs and STs differed from one another in their preference

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for these reasons. The TEs considered reason 'E' as the most important followed by reasons, A, G, F, C, B, D, H, I, J and K and the STs considered reason 'H' as the most important followed by G, E, G, F, A, B, I, J, K and D. The TEs were guided more by academic considerations in granting participatory environment but the STs though conscious of the academic advantages of such an environment preferred other reasons more than the academic, specially when they considered the hierarchical value or importance of these reasons.

There was agreement between the two groups of student-teachers the [ST(O)] and the ST concerning the reasons advanced by them for permitting student participation. Correlations for both the frequency with which these reasons were suggested by them and the order of importance they gave them were significant.

The hypothesis of differential effect of the type and administrative control of the institutions on reasons/justifications offered for permitting participation by student-teachers in administration of the institution can neither be wholly rejected nor accepted.

C. Reasons for not Permitting Student Participation

The teacher-training institutions hesitated to allow their students any measure of share in administration of the institution because they believed that participation by students would cause to lower the standard of education more than it would introduce inefficiency in the management of the institution, lead to indiscipline and create more problems for the administration than solve. Lack of precedence and fear of break or deviation from the tradition were two other reasons offered to resist participation by students in administration of the institution.

All of these reasons were, however, not considered equally popular or important by the respondents. 'There is no such precedence' was the most universal or popular reason but not the most important reason put forth for not permitting student participation. The reasons A and B, i.e., 'Student Control' and 'Student Rights' are considered threat to academic freedom of staff; and 'It is a deviation from the hallowed tradition where teaching is a matter of

leadership and example' were the least acceptable as well as the least important reasons for not permitting student-teachers a share in administration of the institution.

The TEs and the STs differed from each other in the frequency with which they accepted the various reasons and the 'deterrent' values they assigned them. Correlations in respect of both the criteria (1) frequency of offering of reasons, and (2) pooled ratings or rank positions of the reasons for the two groups were .72 and .25 respectively (not significant).

More STs than the TEs reported that training institutions did not permit student participation because they considered it responsible for indiscipline in the institution, inefficient college government, more problems for the administration than it could solve and also as threat to academic freedom of staff. The TEs however, thought that the prime reason for not permitting participation was the apprehension that 'the standard of education will be lowered' followed by the desire to continue the tradition in which students did not play participatory role.

The ST(O) and the STs differed from one another in respect of the frequency with which they perceived training institutions advance various reasons as deterrent to student participation and the relative weightage/importance they assigned them. Correlations (-.3 and .64) between rank positions the two groups accorded to various reasons and between the frequencies with these reasons were suggested by them were not significant.

Institutional variation according to type and administrative control of the institution in reasons for not permitting participation by student-teachers was observed. Correlations between the frequency with which various reasons were put forth, and also between the relative preferences for these reasons in institutions classified according to type as well as administrative control were by and large not significant.

D. State of Student Participation

Participation available to student-teachers in the governance of their institution was very much limited but some degree of partici-

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pation was allowed to them in all the institutions. The institutions reported the distribution of participation scores ranging from 59 to 152 with a mean of 110.58 against the scores of 46, 184 and 115, the minimum, maximum and the mid-value of the participation scale respectively. The TEs and the STs did not significantly differ in their perception of participation available to student-teachers.

The various respondent groups generally agreed among themselves on their observation of the existence of the following five components of participant situation in training institutions.

- (a) Students are told 'why' of policy, programmes and activities of the institution.
- (b) Students are allowed free expression of their views on administrative matters.
- (c) Students identify themselves with authorities as co-partners in determining and working out policy and programmes.
- (d) Authorities invite suggestions from students on administrative matters.
- (e) Authorities take into account views and suggestions of students on administrative matters.

In most of the institutions participation by student-teachers obtained only at the level of giving or sharing of information and did not go beyond this. In 36.4% of the institutions (and this was not a small number especially when authorities seldom took initiative for inviting suggestions from the students or took their suggestions into account) students identified themselves as co-partners in determining and working out the policy and programmes of their institution, had a sense of belongingness to the institution and got opportunities to participate in policy determination and its execution through programme implementation.

Training institutions tended to be relatively liberal in granting participatory role to students in determination of institution's programmes. Student-teachers got opportunities to participate more in programmes and activities than in determination of policy.

In 51.94% of the institutions there was a machinery for formal consultation between students and authorities and formal group meetings were organised. Most of the respondents asserted the worthwhileness of these meetings. Only 10.08% of the entire group

of respondents were averse to such meetings and felt that nothing much was accomplished and time was just wasted in these meetings.

In 100.0% of the institutions student-teachers got chances to speak out their ideas and feelings about matters relating administration of their institution and sometimes also got opportunities to discuss and share their ideas with the authorities. Though respondents differed in their observations about the chances students got to express their views, time made available to students in discussions to present their point of view and the weight their opinions carried in these discussions, but more TEs and STs as a group were satisfied than those who were not satisfied with the number of chances and time made available to students for active participation in discussion on administrative matters and favoured their active participation in group meetings because students' opinions were generally constructive and helped in reaching the group to a decision or in bringing the group to a decision.

Student participation of a 'real' nature obtained only in a few institutions. In most institutions where students played participatory role, participation was only at the surface level. Even the students' union and other such student organisations, which were supposed to be organized for introducing self-government did not function as such in as many as 48.00% of the institutions. And though in 62.0% of the institutions, the function and working of these students organisations were determined jointly in consultation with students and authorities, in 37.1% of them students were reported to act as mere pawns of the authorities to carry out activities as directed by the authorities.

Most of the institutions did not remain impervious to the influences of the students. The students' influence on the programmes and activities and whatever else went in the institution varied from 'some' to 'quite a bit' in majority of the institutions.

E. Area, Type/Manner and Extent of Participation

Training institutions did not equate the various area/aspects of its administration for purposes of participation by student-teachers. In some areas they were liberal in granting student participation

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while in others they were choosy. Participation in the extra curricular activities area was available to student-teachers in 100.0% of the institutions, but in the non-academic, academic and miscellaneous areas in only 79.8%, 55.04% and 32.5% of the institutions respectively.

There was 100.0% agreement between TEs and STs in their assessment of student participation in the extra-curricular and non-academic areas, but there was no such agreement between them in respect of participation in the academic and miscellaneous areas of administration. More TEs than STs reported student participation in the academic and miscellaneous areas and in doing so gave the impression that they identified themselves with authorities in their efforts to show that their institutions were progressive and were in tune with the present day trend of introducing student participation in all areas of administration.

The incidence of student participation varied from item to item within the academic area but no item was out of bounds of students in 100.0% of the institutions. Within the academic area student-teachers were permitted to participate most in the administration of student-teaching programme and least in decisions about course structure and course of studies. Participation was very little in the selection of method and pattern of instruction, participation was relatively more in the administration of library than either in the determination of work load of students and teachers, method of examination or in the determination of college schedule. According to the measure of share that students had in the various items within the academic area, the items could be arranged in the order: Student teaching, library, work load, examination, college schedule, method and pattern of instruction and course structure and course of studies.

Participation of students was relatively more pronounced in activities and issues which did not affect the administrative machinery so much as it affected the student-teachers and their interests directly. Student-teachers were allowed to play participatory role more in matters relating routine functioning of academic programmes and activities than in matters relating administrative policy and decision about academic matters.

The pattern of participation by students in the non-academic and extra-curricular activities area was similar to that in the academic area. Participation by student-teachers was in general limited to items and activities which did not interfere with major administrative policy and decisions of the institution including its financial involvements and commitments. Within the non-academic area students were granted participation more in students' union, physical facilities, hostel and house system than in aspects like aid to students, building and equipment, planning and development of the institution and college finance. Most permissive area of participation was the 'students' union' and 'college finance' the least. Even in the more permissive areas, participation was confined to organisation and playing of activities. Within the extra curricular activities area maximum participation was reported to be available in 'other activities' which included college functions, educational tours and trips and picnics; and least in the area of 'sports, games and athletics': Students did not have much say in framing of the union constitution, union funds, distribution of hostel accommodation, room rent and rules of stay in the hostel; and management of finance and mode and quantum of expenditure in respect of extra curricular activities.

Training institutions in general did not allow their students a measure of share in administration of most of the items/activities under the miscellaneous area. Though some institutions did make provision for student membership on committee for college affairs (32.8%), college statutory bodies (7.1%) and involved them in admission of students (7.1%), participation in most institutions (73.8%) was limited mainly to helping the authorities in maintaining discipline and other such items and aspects which affected the outward show or glamour of the institution rather than those which affected the organisation of institution, its policies and programmes that in the last analysis would bring benefit to students in terms of their educational and professional growth.

Statutory provision for student participation obtained only in 13.7% of the institutions. In most institutions (86.3%) student-teachers played participatory role irrespective of such provision in the institution's statutes. etc.

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Student participation was obtained through student representation on various administrative organs of the institution. The basis of student representation had been sex, courses of study offered, houses/associations and/or office bearers of students' union. Student representation on various administrative organs varied from one administrative area to another. There was a definite and positive relationship between the amount of representation students had and the level/degree of participation they enjoyed greater the student representation more the level of participation at the advisory and decisive levels and also greater the frequency of holding meetings of bodies/committees on which students were represented. Student-teachers found no representation and also no participation at any level in Governing Body, Faculty Committee in 100.0% of the institutions and in academic bodies in 98.02% of the institutions. In 1.98% of the institutions where students did find representation on academic bodies, it was less than those of teachers and participation was permitted only at the lowest, i.e., consultative level. These administrative organs were out of bounds for students either because students were considered incapable of making any constructive contribution or because they dealt with matters which affected students' interests directly. But they were granted greater representation and participation also at higher levels, i.e., advisory and decisive levels in students' union, committee on extra curricular activities and hostel committees because students' interests were at stake more in decisions of these bodies. And these committees met more frequently than in the academic or any other committee on which student representation was less than the teachers.

Most training institutions which permitted student representation on various administrative bodies did not just make an illusion of it but they tried to provide for real participatory situation by letting students have sufficient opportunities to participate in the affairs of the institution.

Most training institutions which permitted student-representation on various administrative bodies by providing sufficient opportunities to students to participate in the affairs of the institution though seemed to provide for meaningful participant situation did not necessarily insure the principle of participation at equal level,

when in as many as 88.4% of the institutions the head of the institution or his teacher representative always chaired the committee's meetings and had greatest influence in moulding decisions of the committees. However, in these institutions students got ample opportunities to speak out their viewpoints on administrative matters and their opinions and viewpoints were generally well taken and the consideration was given to them before final decisions were reached. And most respondents (81.4%) found students' opinions to be constructive and helpful in bringing the group to a decision.

The authorities were able to carry through their viewpoints in committee meetings and demonstrate their influence on decisions of these committees because most student representatives did not actively participate in discussions either for fear of reprisal from their teachers or for the respect they had for them or because of the impression that their voice would not count too much. In 50.4% of the institutions the climate was not really conducive for participation as the students suspected the usefulness of freely expressing their views on administrative matters. In the other 49.6% of the institutions though the climate seemed to be favourable, yet the students were reported to have confidence in their teachers, had respect for them and felt that interests were taken care of by the authorities.

Another factor on which the manner and extent of participation by student-teachers despite student representation and frequent meetings of administrative bodies depended was the role played by teacher representative in these committees. Though in larger number of institutions (56.6%) teachers played the guiding and advising role in formulating decisions on policies and programmes of the institution and set for students an apprenticeship situation for training in administration, but in 43.4% of the institution they not only played the big brothers role but also played the bossing over role with the result that students seldom participated as partners and co-workers in a team where each member was treated more as equal rather than as one who was always to take advice and the other always to give advice.

Institutional variation according to type and administrative control of the institution in the area and extent of participation was generally not observed. The 't' ratios were in most cases not signi-

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ficant and the hypothesis of differential effect of administrative control and type of institution was largely rejected.

F. Views on Student Participation

100.0% of the respondents (TEs and STs) opined in favour of student participation in the governance of teacher-training institutions. Most of these (88.1%) TEs and STs also wanted that institutions should make provisions in their statutes, ordinances, etc., for student participation in their various decision-making bodies. However, a relatively smaller number (56.0%) desired that teachers should be treated at par with authorities as full members of all decision-making bodies.

There was a great deal of agreement among the respondent groups in their views about the method of selection of student representatives on administrative bodies. Most of the (81.4%) TEs and STs as a group opined that election by student themselves and not nomination by the authorities should be the method used for choosing student representatives. As office bearers of the students' union were generally elected persons, 58.1% of the respondents wanted student representatives on administrative bodies to be chosen from amongst those who held office in the union.

100.0% of the TEs and STs were convinced of the educational and administrative advantages of student participation. But most of them pleaded for participation by student-teachers more for its educational rather than administrative value. They held the view that participation by student-teachers in the administration of the institution would raise the tone and educational standard of the institution more than it would help to solve administrative problems.

Although 100.0% of the respondents affirmed the productive and beneficial effect of student participation practices yet they did not, in general, favour conceding to student-teachers a measure of share that was more than 'Just enough'.

There was little discrepancy between the amount of participation students already had and the amount of participation that was desired for them. Most students were satisfied with participation students had in the academic, non-academic and extra curricular

activities areas of administration. But they desired more participation for them in the miscellaneous areas than what was available already. The respondents desired that the academic area should be made the least permissive area, instead of the miscellaneous.

The TEs and STs opined that various items/aspects within each of the academic and extra curricular areas should be equated at par with each other for purposes of student-participation, but they should be differentiated in the non-academic and miscellaneous areas.

About 50.0% (49.6%) of the respondents favoured association of students in decisions relating finance and budgeting for college and 39.5% of them asserted that students should have effective say in the appointment of their teachers and examiners. This was significant when they were conceded no participation in these aspects of administration.

The views of respondents on the levels of participation aspired for were similar to those on the incidence of participation desired in the four areas of administration. The respondents favoured participation by student-teachers at different levels in different areas of administration as also in different items/aspects within the same area. They desired greatest amount of student-participation in the extra curricular activities area followed by non-academic, miscellaneous and academic in that order. In the academic area participation was mostly desired at the lowest, i.e., at the consultative level and in the extra curricular activities area at the highest, i.e., decisive level.

There was discrepancy between the 'real' (as it is) and 'ideal' (as it should be) role played by teacher representatives on committees on administrative matters. The respondents were not entirely satisfied with the role played by teacher representatives. Most of the respondents wanted them to play only the guiding and advising role. No respondent was willing to allow them power to override students' decisions. However, quite a few (39.2%) of them favoured 'veto' power for the head of the institution.

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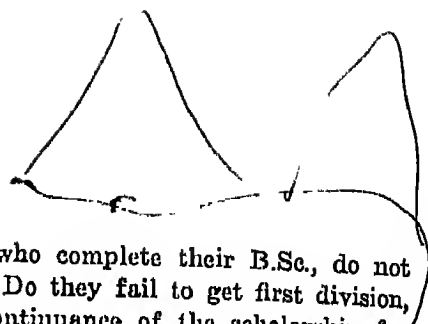
An Investigation into Some Factors Affecting the Achievement of National Science Talent Search Scholars in University Courses¹

Ved Ratna

The sample for the investigation reported here comprised 120 NSTS awardees attending summer schools after having taken the B.Sc. second year examinations of their respective universities. The study reveals, among other things, that higher motivation and better study habits are one characteristic of awardees from 'low status' schools.

Under the National Science Talent Search Scheme (NSTS), scholarships are provided by the National Council of Educational Research and Training for studies in the basic sciences, from B.Sc. first year through Ph.D. About 350 awardees are selected from among the secondary school leavers every year on the basis of a competitive examination at the end of higher secondary school stage.

¹The author expresses here his gratefulness to the NCERT for financial support for this study, and for permission to submit it as his M.Ed. dissertation to the University of Delhi in 1972. He is also grateful to Dr. K. G. Rastogi, Lecturer, and Dr. R.N. Mehrotra, Reader, both of the Central Institute of Education, Delhi, for their guidance and advice in this study.



About half of the awardees who complete their B.Sc., do not continue the scholarship further. Do they fail to get first division, which is needed to qualify for continuance of the scholarship for M.Sc.? Perhaps, majority of those who drop out do fail to get first division, though the exact statistics is not available due to poor response to questionnaire sent to them. Then, why do they not prove upto the mark? The answer, again, is neither available nor easy. Motivated by these questions, an attempt is made in this study to find out some related characteristics of the NSTS scholars.

I. DESIGN OF THE STUDY

The following characteristics of the awardees were studied:

1. Intelligence
2. Education of parents
3. Family income
4. Creativity
5. Interest in co-curricular scientific activities
6. Time devoted to studies
7. Suitability of study habits for scholastic achievement
8. Achievement motive.

The following scores of the awardees in the NSTS examination were also considered.

9. Science Aptitude Test (objective type test).
10. Aggregate of the essay paper, project report and interview (the subjective tests of the examination).
11. Total marks in the examination.

These scores were analysed to find out if (and how) the scholastic attainments of the awardees are connected with their selection for the award of scholarship.

It was felt that, though the NSTS scholars are a highly selected group of students and thus may represent a narrow ability range, yet there might be significant differences among the following groups within them:

- (a) High achievers in the university examinations versus low achievers.

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- (b) 'Progressing'* awardees versus 'regressing'*** awardees (*those who have improved their rank among their peers during the university education; **those who have lost in their rank among their peers).
- (c) Awardees who come from 'high status'* schools versus those who come from 'low status'*** schools (*schools producing N.S.T.S. awardees in large numbers; **schools producing fewer N.S.T.S. awardees).

Thus, the objectives of the present study were to identify suitable criteria to divide the awardees included in the study into above mentioned groups and then to study them for differences on the eleven variables mentioned earlier.

II. THE SAMPLE AND DATA COLLECTION

For practical considerations, the study was done while the awardees were studying in the summer schools organized under the N.S.T.S. scheme. Thus, suitable tests, questionnaires and check-lists were administered in the four summer schools held during May/June, 1971, viz., those held at

1. Patiala for students of Physics	7 students
2. Delhi for students of Physics	52 students
3. Rurkee for students of Chemistry	35 students
4. Chandigarh for students of Botany/Zoology	27 students
Total	<u>121 students</u>

The sample included almost all the awardees in the northern part of the country who were selected for the award of scholarship in the year 1969, and had taken their B.Sc. II year examinations given by their respective universities in April/May, 1971.

III. DEVELOPMENT OF TOOLS

(A) *Test of Creativity*

For assessment of creativity a test was constructed on the lines

of the one developed by Wallach and Wing.^a The subjects were asked to give as many ideas as they could, in response to the questions asking

1. uses of a given object,
2. Similarities between two given objects, and
3. experiments and every-day life observations (observed or speculated) which illustrate a given principle of science.

There were four question items. Since it was intended to be a power test, a liberal time of 2½ hours was allowed. The subjects were asked to write briefly, so that they could write many ideas. It was clarified that they should not be too brief to be intelligible; the examiner should be able to see in any response, existence of a clear idea which is not contrary to the basic principles of science.

Responses were scored for ideational fluency only. Thus, the number of non-repetitive and valid responses were counted for each subject. Detailed guidelines were framed for the use of examiners to help them make more objective judgement as to whether a response is non-repetitive and valid. To reduce the subjective element in scoring, two examiners scored the responses. First judgements by them differed on about 15 per cent responses. The differences were discussed between them and agreed decisions arrived at, refining the guidelines at the same time. Split-half reliability of the full length test, using Spearman's formula was estimated as .65.

(B) *Intelligence Test*

For assessment of general intelligence, "g", the Culture Fair Intelligence Test (Scale-3) prepared by R.B. Cattell and A.K.S. Cattell^b was used. Both the forms of the test were administered, first the A-form and then, after a relaxation period of 5 to 10 minutes, the B-form. Though the total score on both the forms would have constituted a more reliable measure of "g" due to greater number of items, only the scores of the B-form were considered. The A-form

^aWallach, Michael A., and Cliff W. Wing Jr., *The Talented Student*, New York: Holt, Rinehart and Winston, 1969.

^bCattell R. B., and A.K.S. Cattell, *Handbook For The Culture Fair Intelligence Test, Scale-3*. Illinois: Institute of Personality and Ability Testing, 1959.

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was treated as the practice test. This was decided as a result of the following analysis.

It was discovered after the administration and scoring of the tests that, in every summer school, not only were the scores on the B-form slightly higher than those on the A-form, but also they had smaller dispersion. The pooled S.D. of the four means of the scores on the B-form (viz., for the Patiala, the Delhi, the Rurkee and the Chandigarh summer schools) was significantly smaller than that on the A-form. ($t=3.48$ for df 116 and $P < .01$). This suggested existence of some extra individual differences among the awardees while taking the A-form, which were "evened up" by the provees of taking the A-form. Perhaps some awardees had much lower level of "test sophistication", (i.e., the adaptibility to situations presented by the test) than others and thus obtained larger gains by practice on the A-form.

Again, a group of 22 low scorers on the A-form was selected from the four summer schools and compared with the entire sample. It was found that this group had significantly larger difference in A-form and B-form scores, and at the same time tended to belong to schools which produced fewer awardees. There was thus, a tendency of concentration of students with low level of "test sophistication" in this group.

(C) *Questionnaire for Interest in Co-curricular Scientific Activities, Time Devoted to Studies, Education of Parents and Family Income*

A questionnaire was prepared asking the subjects about their interest in co-curricular scientific activities, in order to assess manifested interest in them. Responses were quantised in numerical terms with a total maximum credit of 12 points. Split-half reliability of the tool was estimated as .63 for the full-length questionnaire using Spearman's formula.

An item in the same questionnaire asked the subjects to state the time they devoted in one week for studies at home/library.

The educational status and economic status of parents of the awardees were assessed by a brief questionnaire designed on the basis of the socio-economic scale by Dr. Kuppuswami and the socio-economic scale evolved in the CIE, Delhi. The economic status score was calculated as per capita income in units of Rs. 50 per month.

The educational status scores were estimated in numerical terms by assigning suitable scores to the educational attainments (i.e., the highest qualification) of their mothers and fathers as follows:

Illiterate	= 1 point
Primary/Middle	= 2 points
High/Hr. Sec.	= 3 points
B.A./B.Sc./B.Com.	= 4 points
M.A./M.Sc./M.Com.	= 5 points

For comparability of cases in which only one parent is alive with those in which both are alive, the mean of the father's and the mother's educational status scores was taken in each case of the latter type.

(D) *Achievement Motive*

For assessment of achievement motive, the check-list developed by Dr. N.K. Datta and Dr. K.G. Rastogi⁴ was used. It contains 30 items. Thus it has a maximum credit of 30 points and a minimum of zero point.

(E) *Study Habits*

To estimate as to how far a subject possesses study habits conducive to scholastic achievement, a modified version of the inventory developed by Dr. K.G. Rastogi⁵ was used. The original inventory

⁴The check-list was developed at Central Institute of Education, Delhi, but has not yet been published.

⁵Rastogi, K.G. *Study Habit Inventory for College Students*, Report of the Third Research Seminar of Ph. D. Students, Agra: Dayal Bagh, 1966.

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had 66 items with three response categories (yes, ?, no). For use in the present study, the inventory was discussed with a university teacher. Items which did not appear to relate to situations existing in B.Sc. classes, were either dropped or modified. Thus, the number of items was reduced to 55. Consequently, the original reliability of the inventory of .79 is expected to have reduced to .75.

The response categories of the inventory were also modified to (frequently, sometimes, never) in order to elicit more dependable responses. Marks to responses were assigned as follows:

+1=a response indicating a good habit

0=a response indicating neither good nor bad (sometimes)

-1=a response indicating a poor habit

Thus the inventory had a maximum credit of +55 points and a minimum of -55.

IV. FORMATION OF GROUPS

(A) Groups of Students of High/Low Status Schools

For making groups of awardees who belonged to 'high status' or to 'low status' schools one possibility was to rank the schools according to the number of awardees produced by them in the NSTS examination, 1969. But there was a question to be answered. Did there exist a stable hierarchy of status within the top $\frac{1}{2}\%$ secondary schools of India which produced NSTS awardees in 1969, as may be expected to exist when complete spectrum of all the secondary schools in the country is considered?

To answer this question, the number of awardees produced by various schools in the years 1969, 1970, and 1971 were tabulated. Then contingency coefficients for pairs of examinations were calculated by 6×6 contingency tables. The coefficients were corrected for the table size by taking the ratio $C/(\text{maximum } C)$. For various pairs of examinations, the results ranged from .51 to .67. This indicated fair stability of 'status' as measured by the number of NSTS awardees produced by a school in a single examination.

For still greater reliability, the grouping was based on the total number of awardees produced during 1969-71. Thus 35

awardees belonging to schools each of which produced 16 or more awardees during 1969-71 and 33 belonging to those each of which produced 2 or 1, were respectively placed in the 'high status' and the 'low status' groups.

(B) *High/Low Achiever Groups*

For making groups of high achievers and low achievers, B.Sc. second year marks were asked in the questionnaire. Marks of a group of awardees, studying the same course in the same university, were arranged in rank order. Then each such group of awardees, an approximately equal number was taken from the top and the bottom ranks, leaving a sufficient gap in between. Thus 28 high achievers and 29 low achievers were selected.

(C) *Progressing/Regressing Groups*

For making groups of 'progressing awardees' and 'regressing awardees' a measure of one's progress was defined as Progress Score = $(\% \text{ marks in the second year}) - (\% \text{ marks in Higher Secondary})$. For the percentage marks in higher secondary examination, only those subjects of the curriculum were considered which determined one's division in the B.Sc. examination.

The awardees who had taken B.Sc. second year (Physics Hons.) examination of the University of Delhi, had taken three different higher secondary examinations. It was felt necessary to investigate whether the 'progress scores' of these three sub-groups of awardees could be considered in one group and arranged in rank order for selecting the 'progressing' and the regressing' awardees, thus assuming the three examinations a equivalent.

To probe into the above question, the 'progress scores' of the three sub-groups were subjected to F-test. According to the above assumption the three means were expected to be equal because, whereas individual students may have progressed in studies at varying speeds, the status of each sub-group (taken as a whole) relative to other sub-groups could be assumed to have remained unchanged

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during the two years of education. However, the F-ratio being significant at 0.5 level, this assumption had to be rejected.

After this analysis, the formation of 'progressing' and 'regressing' groups was not possible in the other three summer schools due to diversity of courses among the students. For the Delhi summer school, a range of ± 5 from the mean "progress score" of a sub-group was taken as "status-quo" within that sub-group, scores on the positive side of this range being "progression" and those on the negative of this range being "regression". Thus, a progressing group ($N=14$) and a regressing ($N=15$) were formed in the Delhi summer school only.

V. ANALYSIS OF DATA

In each of the three types of grouping, the high and the low groups were compared for their performance in the eleven variables under study. The table on the next page presents a gist of these comparative studies. A positive sign with the value of critical ratio(t) indicates a higher mean score of the 'high status' group or the 'high achiever' group or the 'progressing' group, respectively in the three groupings. The number of students in the high and the low groups involved in the calculation of a particular ' t ' may be one or two less than that mentioned in the concerned column heading because one or two students may not have answered the questions in respect of the concerned variable.

VI. FINDINGS

1. It appears from the various analyses that family income (S. No. 6 in the table) is the most prominent factor in favour of the so-called better students, whether chosen by the criterion of high achievement on the university examination, or of improving their rank among their peers during the education, or of belonging to 'high status' schools.

2. Higher achievement motivation (S. No. 11) better study habits (S. No. 10) and more devotion to studies (S. No. 9, putting in more time for studies) seem to be the characteristics of awardees from

Table Showing Comparative Studies of Various Groupings of N. S. T. S. Accordance on the Various Variables Related to their Studies

S. No.	Variable	Students of High/Low Status Schools				High/Low Achiever Groups				Progressing/Regressing Groups			
		M OF HIGH GROUP N=35	M OF LOW GROUP N=33	CRITICAL RATIO (t)	LEVEL OF SIG. (p)	M OF HIGH GROUP N=28	M OF LOW GROUP N=29	CRITICAL RATIO (t)	LEVEL OF SIG. (p)	M OF HIGH GROUP N=14	M OF LOW GROUP N=15	CRITICAL RATIO (t)	LEVEL OF SIG. (p)
1	N.S.T.S. Total	137.40	130.81	+2.28	.05	136.52	129.75	+2.15	.05	129.07	131.93	-1.10	n. s.
2	Science Aptitude Test	67.06	59.71	+4.16	.0001	67.16	63.25	+1.47	n. s.	60.64	67.43	-2.97	.01
3	Subjective Test	70.41	71.10	-29	n. s.	69.72	66.50	+1.15	n. s.	68.43	64.50	+1.14	n. s.
4	Intelligence	30.54	27.94	+3.10	.005	29.89	28.82	+33	n. s.	31.36	29.47	+1.36	n. s.
5	Ec. Status of Parents	6.66	4.62	+2.41	.05	6.39	4.86	+2.29	.05	8.18	4.21	+4.63	.0001
6	Educational Status of Parents	4.05	3.61	+1.79	n. s.	4.16	3.88	+1.06	n. s.	4.27	3.97	+88	n. s.
7	Creativity	22.82	27.59	-1.77	n. s.	23.78	28.62	-1.00	n. s.	24.21	26.13	-44	n. s.
8	Interest in Scientific Activities	4.14	4.38	-39	n. s.	3.36	4.31	-1.49	n. s.	4.71	4.53	+22	n. s.
9	Weekly Time Devoted To Studies	17.00	22.65	-2.10	.05	20.37	15.82	+1.46	n. s.	19.16	17.21	+54	n. s.
10	Study Habits	16.91	23.62	-2.16	.05	19.00	19.79	-21	n. s.	21.21	22.60	-31	n. s.
11	Achievement Motive	9.72	11.42	-1.40	n. s.	10.57	11.16	-41	n. s.	9.88	11.80	-99	n. s.

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'low status' schools.

3. Though it is not a statistically significant finding, but there is indication that lower creativity (S. No. 7) and less interest in co-curricular scientific activities (S. No. 8) are the characteristics of those among the NSTS awardees who show better scholastic attainment in university examinations. Similarly, lower creativity seems to be the characteristic of those who belong to 'high status' schools. It can only be guessed, at present, as to whether one's creativity does not help in one's studies at the university and in one's selection in the NSTS examination.

4. Among the tests of NSTS examination, a high score in the science aptitude test (S. No. 2) is the important characteristic of those awardees who come from 'high status' schools.

5. Analysis of high and low achievers in the present study suggests that a candidate's scholastic ability, as defined by scholastic attainment in the university examinations, may be a significant factor in his/her competing successfully in the NSTS examination (vide S. Nos. 1, 2 and 3).

6. Higher score in science aptitude test (S. No. 2) is the characteristic of the 'regressing' group. Probably there exists a substantial group among the NSTS awardees who have over-achieved in the higher secondary examination as well as in the science aptitude test which enabled to obtain the scholarship. But, later on, they could not maintain that rank among their peers, which they had secured at the higher secondary examination.

Secondary Findings

As discussed earlier, some other analyses also were made during the course of developing of tools and making the groups. These analyses lead to the following findings. They are not connected directly with the main objectives of the study.

7. Different NSTS awardees seem to possess very different levels of 'test sophistication', i.e., adaptability to situations presented by a new test, such as the intelligence test. This is perhaps due to their varied educational backgrounds.

8. Even within the narrow range of top quality schools of India, which have been producing NSTS awardees in the past, there are sufficiently stable individual differences among the schools. Some schools consistently turn out more scholarship holders than others. Though the size of the schools is also a factor here, the author knows from his personal knowledge of schools in Delhi that the school size is only the less important factor and the number of scholarship holders from a so called 'good school' may be very much out of proportion of its size. It can only be guessed as to how enormously wide may be the spectrum of educational standards of the schools, if all the schools of the country are considered.

9. Significant differences seem to exist among the standards of different examinations at the end of the higher secondary stage of education.

VII. SUGGESTIONS FOR FURTHER RESEARCH AND IMPLICATIONS

1. With reference to the finding (1) above, it is an issue for further research as to whether money helps one in one's studies and thus to gradually improve one's rank among one's peers, or perhaps the money of the family as well as better scholarship of children are both the outcomes of some deeper family attitudes, traditions, etc. If the former is the case, then in what respects does money help significantly in one's studies? If the latter is the case, then what are those family factors? Some clinical research on noteworthy 'regressing' and 'progressing' students may also be helpful in investigating this problem.

2. With reference to finding (3) above, it is an issue for further research as to what is the role of creativity in the education of the awardees in the universities and in the selection examination under the NSTS scheme. What modifications can be done in University programmes so that one's creativity and one's educational experience at the university are a help to each other? What modifications can be made in the process of selection of the awardees in order that candidates with creative ability and scientific aptitude are selected with greater validity? Such research could be useful for modifying the nurturing programmes and activities in the summer schools for the

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NSTS awardees too.

3. With reference to the finding (5) above, it is a matter for research to find out how far scholastic ability, as defined by achievement in various science subjects in the curricular examinations, is related to and is a factor in the NSTS examination. How could aptitude for science, which in terms of the aims of the NSTS scheme perhaps means 'potentiality to create scientific ideas and inventions in later life', be differentiated from present knowledge?

4. With reference to the finding (7) above it is a matter for research as to how far the students with various educational backgrounds vary in their 'test sophistication'. Further, it implies that in any future programme of using such tests with the awardees (or the candidates for an examination), it may be important to attempt to 'even up' such differences by an initial practice period.

5. The finding (8) above implies that for most schools, even the theoretical probability of ever turning out a scholarship-holder may be zero. On the other hand, to assume that the entire talent of the country is located in a small fraction of the secondary schools, does not seem to be valid. Thus it is an issue for research to find out the means (psychometric devices as well as procedural devices) by which reasonable opportunity can be given to the talents buried in the culturally deprived sections and areas of the country.

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Verification of the Psychological Theory of Composite Score to be Used as a Measure of Criterion Variable

Amar Singh Dhaliwal
Gurmel Singh

This study was undertaken to verify whether an empirically discovered imperfect coefficient of correlation between the marks of two subjects in the school curriculum is significantly less than the degree of perfect correlation. The authors find that the marks pertaining to different subjects of the curriculum are not perfectly correlated.

Quite a few foreign studies (Gebhart and Hoyt, 1958; Krug, 1959) and almost all the studies in India, to quote just a few of the recent ones (Bhatnagar, 1969a, 1969b; Rao, 1963; Sharma, 1967; Sharma and Garg, 1971; Sinha, 1966, 1970) have based measure of criterion variable on a composite score comprising marks in different subjects of study. It is doubtful whether examination marks pertaining to different subjects can be put to a composite score. Psychologically speaking, if similar rather identical mental functions, are involved in dealing with the abstracted contents related to different subjects of curriculum, the marks representing performance in different subjects may be pooled together. But, on the other hand, if performance in different subjects of study depends upon the function-

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ing of different mental processes, then there is no justification in pooling them to yield a composite score as measure of academic achievement. Beehman (1964), criticizing the studies of Gebhart and Hoyt (1958) and of Krug (1959), recommends that marks (or grades) in different subjects should be kept separate in educational and psychological researches. Not only that the marks in different subjects are not, psychologically speaking, poolable but statistically also they need some sort of adjustment before they are pooled together. Otherwise the composite score carries a distorted picture of one's academic performance. It is the hunch implied in these psychological and statistical observations which has been verified in the present study.

Purpose of the Present Study

Since most of the researches (some of which have been referred to above) employed a composite score based on marks in different school subjects as measure of criterion variables, it has been hypothesized in the present study that perfect relationship is operating in the marks pertaining to different subjects of the curriculum and the difference between the degrees of perfect and the empirically discovered imperfect correlation is not significant. The first purpose of the present study is to verify whether empirically discovered imperfect coefficient of correlation between the marks of two subjects of school curriculum is significantly less than the degree of perfect correlation.

Keeping the fact in view that in the studies referred to above, from which the present investigation seeks inspiration, examination marks pertaining to different subjects of curriculum were added together without making any kind of statistical adjustments, it has been postulated in the present study that variances operating in the marks pertaining to different subjects are not significantly different.

Method and Procedure

Keeping the purposes of the present study in view, examination marks given by the class teachers on the basis of essay type examinations in English, Maths, Social Studies and Punjabi, taught as com-

pulsory subjects at the high school level, were collected on a sample of 38 students.

Statistical Analysis of the Data

Six [i.e., $\frac{N(N-1)}{2}$]¹ correlations were worked out by correlating

marks obtained by 38 students in English, Maths, Social Studies and Punjabi, taking two variables at a time. Then t-tests of significance were applied to verify whether those empirically discovered six r's were significantly less than the measure of perfect relationship. The results of t-test are represented in Table 1.

Since the empirically discovered r's based on a small sample comprising 38 individuals are very unstable, it was thought desirable to raise the values of these r's upto the maximum possible limits on the positive side. For this purpose standard errors of r's were computed with the help of the appropriate formula² suggested by Garrett (1965, p. 198). Then maximally possible degrees of correlation were worked out by multiplying relevant standard error of 'r' with 2.58 and then adding the thus calculated value to the empirically discovered value of 'r'. In this way six empirically discovered values of 'r' were raised to the maximum possible limits on the positive side. Then t-tests of significance were applied to verify whether these empirically maximum possible degrees of correlation were significantly less than the measure of perfect relationship. The results of these t-tests of significance are represented in Table 2.

In order to verify whether identical variances were operating in the distributions of the marks pertaining to English, Maths, Social Studies and Punjabi, standard deviations were computed. Then 't' test of significance was applied to adjudge if these standard deviations differed significantly from one another. The results of the six 't' tests are presented in Table 3.

¹'N' indicates number of subjects of curriculum included in the study (i.e., 4).

² $SE_r = \frac{1-r^2}{\sqrt{N}}$ where r stands for empirically discovered correlation and N refers to the size of the sample.

TABLE 1

Differences of Empirically Discovered Coefficients of Correlation from Theoretically Possible Degree of Perfect Correlation

$N = 33$

<i>Measures correlated</i>	<i>Empirically discovered 'r'</i>	<i>Fisher's z value z_1</i>	<i>Theoretically possible 'r'</i>	<i>Fisher's z value z_2</i>	$z_1 - z_2$	<i>OR</i>
English vs. Maths	.61*	.71	1.00	2.99	2.23	9.91*
English vs. Social Study	.41**	.44	1.00	2.99	2.55	11.1*
English vs Punjabi	.60*	.69	1.00	2.99	2.30	10.0*
Maths vs. Social Study	.34**	.35	1.00	2.99	2.64	11.48*
Maths vs. Punjabi	.55*	.61	1.00	2.99	2.37	10.3*
Social Study vs. Punjabi	.48	.52	1.00	2.99	2.47	10.7*

*Indicates significance beyond 1.1 level.

**Indicates significance at 5% level.

TABLE 2

Differences of Maximally Possible Degrees of Empirically Discovered Coefficients of Correlation from Theoretically Possible Degrees of Perfect Correlation

N=38

<i>Measures correlated</i>	<i>Empirically discovered</i>	<i>SEr</i>	<i>Maximally possible +ve r with N=38, i.e., r+SEr (2.58)</i>	<i>Fisher's z value z₁</i>	<i>Theoretically possible r_p</i>	<i>Fisher's z value z₂</i>	<i>z₁-z₂</i>	<i>CR</i>
English vs. Maths	.61	.12	.919	1.56	1.00	2.99	1.43	6.21*
English vs. Social Studies	.41	.13	.745	.96	1.00	2.99	2.03	8.82*
English vs. Punjabi	.6	.13	.935	1.70	1.00	2.99	1.29	5.6*
Mathematics vs. Social Studies	.34	.127	.667	.80	1.00	2.99	2.19	9.52*
Mathematics vs. Punjabi	.55	.113	.84	1.22	1.00	2.99	1.77	7.7*
Social Studies vs. Punjabi	.48	.124	.80	1.10	1.00	2.99	1.89	8.21*

*Indicates significance beyond 1% level.

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TABLE 3
Differences among S.D.'s of the Marks in Different Subjects of Curriculum

N=38				
<i>Subject</i>	<i>S. D.</i>	<i>Comparison between S. D.'s</i>	<i>t*</i>	<i>Significance</i>
English	13.5	English vs. Mathematics	2.13	Significant at 0.5 level
Mathematics	18.2	English vs. Social Studies	0.84	Not significant
Social Studies	11.9	English vs. Panjabi	2.56	Significant at 0.02 level
Punjabi	9.6	Mathematics vs. Social Studies	2.74	Significant at 0.01 level
		Mathematics vs. Panjabi	4.12	Highly significant
		Social Studies vs. Panjabi	1.64	Not significant

*In computing t values, the corresponding coefficients of correlation have been taken from Table 1.

Interpretation of the Results

The results presented in Table 1 clearly demonstrate that all the six values of intercorrelations among the marks pertaining to four subjects of curriculum are significant and positive. The results of 't' test confirm that all the six coefficients of correlation are significantly less than 1.00, the index of perfect correlation. Not only this that the empirically discovered coefficients of correlation are less than perfect but when these six values are taken to the maximum possible extent one by one by giving full consideration to their respective standard errors. These six coefficients of correlation still remain significantly less than 1.00, the index of perfect correlation.

Keeping the results presented in Table 1 and Table 2 in view, it may be asserted that perfect relationship is not operating in the marks pertaining to different subjects of curriculum. Our first hypothesis, according to which it was postulated that perfect relationship operates in the marks pertaining to different subjects of curriculum, stands rejected.

From the perusal of the results given in Table 3 it is clear that out of six results of 't' tests four are significant. Converting these results into percentages, it may be said with 66.6% confidence that the standard deviations of the distributions of the marks pertaining to different subjects of curriculum are significantly different from one another. In this respect it was hypothesized that variances operating in the measures of various subjects of curriculum are not significantly different. There is 66.6% evidence against this hypothesis. Therefore the hypothesis of no difference among S.D.'s also has not been established. Hence the marks pertaining to different subjects are not additive without making certain statistical adjustments.

Discussion

So far as the degree of relationship between the marks of two subjects of curriculum is concerned, the results of the present study are in consonance with those reported by Vernon (1965, p. 135). The results comprising 13 intercorrelations reported by him range from 0.274 to 0.505 only. The degrees of correlation empirically discovered in this study range from .34 to .61. It may be concluded that all the abilities with which teachers are concerned are, to a greater or lesser extent, positively correlated but they are not perfectly associated with one another. Not only that empirically discovered coefficients of correlation are significantly less than perfect but the empirically maximum possible limits of these r 's are also significantly less than the index of perfect correlation. The phenomenon of imperfect relationship discovered in the study empirically challenges the theory on the basis of which it is assumed that examination marks pertaining to different subjects of school curriculum are additive. Moreover, the theory of regression claims that whenever the degree of correlation between two measures is less than perfect, the individuals who fall well above average on one measure tend to be less superior on the other and those who fall below the average on the first measure tend to be less inferior on the second (Of. Thorndike, 1963, Walker and Lev, 1958). When the measures of two variables which are not perfectly related are put to a composite score, the variance represented by the composite score is significantly different

from the variances operating separately in the measures of the two variables, sheerly because of the tendency of regression operating in the measures of imperfectly correlated variables.

The studies (Gebhart and Hoyt, 1958; Krug, 1959; Bhatnagar, 1969a, 1969b; Rao, 1963; Sharma, 1967; Sharma & Garg, 1971; Sinha, 1966, 1970) designed to explain the variance operating in the measures of academic achievement will fail to put up any rationale on the basis of which examination marks pertaining to different subjects were put to a composite score without accounting for the tendency of regression.

Moreover, when the standard deviations of the measures to be put to a composite score are significantly different (as has been discovered in case of four comparisons given in Table 8), the measures put to a total carry different weights. It contradicts the pedagogic theory which claims that examination marks in compulsory subjects are of equal importance. In addition to this, Gurmel (1973) discovered that the results based on the composite score worked out with the help of statistically sound techniques are significantly different from those based on the composite score computed by simply adding the marks pertaining to various subjects of curriculum.

Here also the studies under reference will fail to explain as to why marks pertaining to different subjects of curriculum were not pooled with the help of statistically sound techniques.

Conclusion

The marks pertaining to different subjects of curriculum are not perfectly correlated. Therefore, it may safely be concluded that they are not representing perfectly identical mental functions. Most often variances of examination marks in different subjects of curriculum are not equal and when they are totalled together different measures carry different weights into the composite score.

Suggestion

Bechman (1964) seems to be right in suggesting that marks in different subjects of curriculum should be kept separate in the in-

vestigations aspiring to determine the factors of academic achievement. If after all they are to be totalled together, statistically sound methods must be employed.

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Application of Phatak Draw-a-Man Scale to Age-groups Below 6 and Above 10 Years

Pramila Phatak

The author reviews the relevant observations reported by three M.Sc. students who studied the application of the Phatak Draw-a-Man Test (1966) to the age-groups 2½-6 years and 10-16 years.

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Phatak Draw-a-man Scale for Indian children was published in 1956. After about ten years, Draw-a-man Test for Indian children was published which gives variety of norms based upon large samples of children from urban and rural areas in Gujarat along with standardisation results and instructions for using the scale. The norms presented relate to age-groups of 6 to 10 years (Phatak 1966). During the last few years interest in the scale has been increasingly indicated through the research articles published in Indian journals and personal communications. Majority of those who communicated were students working on the scale or using it as a supplementary tool in the research requirement for some degree. Such studies are usually not followed after the degree is earned but the communications have helped the author to develop continued interest in the scale.

The published scale (Phatak 1966) is originated from Goodenough Draw-a-man Test (Goodenough 1926). In her scale Goodenough had divided the human figure drawings into two categories. Class A drawings were drawn at preliminary stage and could not be recognised as of human figure. Class B drawings were drawings which

could be recognised as of human figure at least in some part and hence could be scored. Goodenough scale of fifty-one points could be applied to only Class B drawings. The standardisation sample ranged from 4 to 12 years of age; the tentative norms relate to age groups of 3 to 13 years. Harris revised Goodenough Draw-a-man Test with one of the objectives of extending it into adolescent years. He extended the scoring points to 100 by modifying some of the original fifty-one points and adding to them some new ones. Out of these 100 scoring points he retained 73 which satisfied his predetermined selection criteria. He also added a parallel scoring scale for Draw-a-woman Test. Harris presented variety of norms for age groups 3 to 15 years; the samples used for standardisation confine to age groups of 5 to 15 years.

In India those who used Goodenough Draw-a-man Test before Phatak scale was published had used it on wider range of age than that covered by Phatak scale, that is, 6 to 10 years (Menzel 1935; Shrimali 1944). The use of human figure drawings as a part of wider study of children had also covered a wider range of 3 to 15 years (Sen; Joseph 1953). The Phatak scale was evolved as a part of work submitted for the Ph.D. degree. The selection of the lower age limit for studying Goodenough Scale was a matter of practical convenience and ease of data collection. The upper age limit was determined in the light of the observations about evolution in the drawings of the child observed by earlier workers in the field. (Chamberlain 1900, Sully 1912). The present-day studies confidently indicate that human figure drawing is a convenient and revealing tool for child study and a standardised procedure of assessing the figure for judging the intellectual maturity is possible for a wider age range than that covered by the published Phatak Scale. An exploratory study of applying the scale to age groups under 6 and above 10 was undertaken with the help of three M.Sc. students who showed interest in working on Draw-a-man Test as a part of their research fulfilment for the degree.¹ The present article is based upon the work done by the three students.

Lower Age Limit of the Scale

The application of the scale is possible only if the human figure

Sushila James (March 1967), Aruna Sase (March 1969), and Vandana Sharma (October 1970)

drawing of the child has at least some recognisable indications of the body parts, may be even in a very crude form. Hence, the lower age limit of the applicability of the scale be located by using the criterion of appearance of some scorable features in children's drawings. Table 1 gives the combined observations reported by James (1967) and Sase (1969) on this issue.

TABLE 1

Frequency and Percentage of Scorable Drawings by Children of Age-groups 2 Years 6 Months to 6 Years 5 Months

<i>Age range in yrs. & mths.</i>	<i>Mid-age</i>	<i>N</i>	<i>'f'</i>	<i>%</i>
2y. 6 m. to 3 y. 5m.	3 yrs.	178	28	15.7
3 y. 6. m. to 4 y. 5m.	4 yrs.	513	311	60.6
4 y. 6.m to 5 y. 5m.	5 yrs.	876	544	62.1
5 y. 6. m. to 6 y. 5m.	6 yrs.	255	255	100.0

Table 1 clearly indicates that the scorable figures start appearing at the age of three years in the drawings of children under study. James and Sase both have accepted 4 years as the lower age limit for confident application of the scale as both of them have independently observed more than 60% scorable drawings in their groups of 4 years to 4 years 5 months.

Upper Age Limit of the Scale

The upper age limit of the applicability of the scale has to be decided on different criteria than the one used for locating the lower age limit. The rising trend of the mean scores as the age increases might be considered as one criterion. The age at which the trend gets stabilised or reversed perceptibly may be noted as the upper age limit of the scale. Another criterion which might be thought of is the scoring limit of the scale. The age at which the mean plus 1 standard deviation reaches the maximum possible score, i.e., 61, might indicate the age limit because of the limitations of the scoring system.

Sharma (1970) has studied two independent samples of age-groups 10 to 16 years, one for exploratory study and the other for calculating norms. The mean scores with their S.D.s and the 't' values of differences in the means of the successive age-groups in both the samples are reproduced in Table 2.

TABLE 2
Mean, S. D. and 't' Values for the Differences in Mean Scores of Successive Age-groups of Exploratory (N₁) and Normative (N₂) Samples

<i>Age in Yrs.</i>	<i>N₁</i>	<i>M₁</i>	<i>S.D.₁</i>	<i>'t'₁</i>	<i>N₂</i>	<i>M₂</i>	<i>S.D.₂</i>	<i>'t'₂</i>
10	99	34.1	7.08		99	29.42	5.6	
11	113	35.03	6.0	1.0	174	32.5	6.96	4.03*
				0.05				2.13
12	113	35.47	6.35	2.1*	206	33.95	7.32	1.5*
13	107	37.37	6.80	4.5*	269	34.80	7.36	3.0*
14	110	41.6	6.80	0.57	283	36.78	7.88	1.8
15	81	40.98	6.29	0.90	245	38.12	8.23	0.39
16	41	39.6	7.00		127	38.46	7.84	

*Significant at .05 or .01 level.

In both the groups the rising trend is clearly observed upto the age of 14 years. The differences in the mean scores of the successive age-groups are statistically significant at least in one of the two pairs of the ages in the two samples. The differences in the mean scores of age-groups beyond 14 are small and do not confine to the rising trend with the increasing age, especially in the smaller group. Sharma, therefore, has considered 15 years as the upper limit for the application of the scale under study. However, the other criterion suggested here does not limit the scale to the age of 15 years. The highest observed mean plus its one standard deviation make 48.8 which are short by 12.7 to reach 61.

Validity of the Scale by External Criteria

All the three investigators (James 1967, Sase 1969, Sharma

1970) have studied the validity of the scale when applied to the age-groups of their respective studies. Each one of them has selected the external criteria suited to the age groups they studied. Table 3 gives the details about the noted validity scores for the various groups against different criteria.

TABLE 3
Validity Scores of the Scale from the Three Studies

<i>Investigator</i>	<i>N</i>	<i>Age in Yrs. & mths.</i>	<i>Criterion Test</i>	<i>r'</i>
James	5	4 y. 1 m. to 4 y. 5m.	Letter International Performance Scale	.024
"	9	4 y. 6m. to 5y. 5m.	" "	.42
"	9	5 y. 6m. to 6y. 5m.	" "	.73
Saso	80	4 yrs. to 6yrs.	Goodenough Scale	.89
"	80	" "	Goodenough-Harris Drawing Test	.80
Sharma	65	10 yrs. to 13 yrs.	G. B. Shah's Non-verbal Group Test of Intelligence	.46
"	110	14 yrs. to 16 yrs.	Lele's Verbal Group Test of Intelligence	.23
James	5	4 y. 1 m. to 4y. 5m.	Teachers Ratings	.32
"	9	4 y. 6m. to 5y. 5m.	" "	.43
"	9	5 y. 6m. to 6 y. 5m.	" "	.63

Phatak (1966) in her report has given ten coefficients of correlation with five different standardised tests. Her samples vary from 12 to 133 children ranging from 5 to 10 years of age. Those include 3 samples of children from the U.S.A. The coefficients ranged from .30 to .61, the mode being .50. She has also quoted seven coefficients of correlation with teachers' ratings from different studies. The samples ranged from 13 to 254 children of age groups 5 to 9 years. The coefficients range from .13 to .69. The observed coefficients of the scale applied to age-groups below 6 and above 10 compare well with Phatak's observations (1966), and hence support confident extension of the scale to age-groups 4 to 14 years.

Reliability of the Scale

Test-retest reliability is reported by James (1967) by using a

sample of 158 children. She collected the repeated performance after an interval of 14 to 16 days. The children ranged from 3 years 6 months to 6 years 5 months. The coefficient of correlation between the two drawings was noted to be .84. Sharma (1970) did a similar study by using a sample of 150 boys and girls ranging from 10 to 16 years of age. She collected the second performance of the children after an interval of 2.5 months. The reliability coefficient of correlation between the scores on the two drawings was noted to be .74. Phatak (1966) has quoted 14 coefficients of correlation between test-retest performance of children ranging from 6 years to 9 years of age. The various samples ranged from 12 to 100 children. The interval for retest varied from 9 days to 3 months. The 14 coefficients of correlation ranged from .57 to .95. The test-retest results with samples below 6 and above 10 years of age are acceptable in the light of the observations reported by Phatak (1966).

Objectivity of the Scoring System

The inter-score agreement noted by James (1967), Sase (1969) and Sharma (1970) are given in Table 4. Sase (1969) has reported a similar study for Goodenough scoring and Goodenough-Harris revision of Draw-a-man Test. These results are also included in Table 4.

TABLE 4
Inter-scorer Correlation Coefficients

<i>Investigator</i>	<i>Scale</i>	<i>Age in yrs.</i>	<i>N</i>	<i>Other scorer</i>	<i>"r"</i>
James	Phatak	4 yrs. to 6 yrs.	100	School teacher	.86
"	"	" "	100	Research Asst.*	.98
Sase	"	" "	80	Research Asst.*	.92
Sharma	"	10 yrs. to 16 yrs.	144	Research Asst.*	.84
Sase	Good enough	4 yrs. to 6 yrs.	80	Research Asst.*	.93
"	Good enough— Harris Revision	4 yrs. to 6 yrs.	80	Research Asst.*	.92

*Experienced with the scale.

The inter-scorer correlation in standardisation groups (Phatak 1966) range from .64 to .959. It is obvious that all results in Table 4 indicate acceptable objectivity of the Phatak scale when applied to lower and upper age-groups than 6 and 10 years respectively.

Item Analysis

James (1967) has studied the validity of scoring items by grouping them into 14 areas in the same manner as in Phatak (1966). She applied the test of increase in the percentage scored as the age increases. Out of 14 groups she observed the expected trend in 13 groups for both boys and girls. In the remaining group which was 'indication of environment or action' there was a perceptable drop in the scored percentage in the oldest group of boys.

Sharma (1970) did a similar study of the same major scoring points for the age-groups of 10 to 16 years. She did not find the continuous rise or fall in the scored percentages as the age changed for any of the item category except one. The fluctuating percentage scored for items accompanied by continuous increase in the mean scores at successive ages need further critical explorations.

Comments and Conclusions

The three studies confidently support the application of Phatak scale to cover the age range of 4 to 14 years. The next step would be to calculate continuous norms for the total age-group of 4 to 14 years. This could not be done even tentatively because of the differences in the age classifications used by different investigators. Moreover, such an attempt seems to be futile as the studies have been done by fragments over a period of approximately 15 years (1955 to 1970).

The three studies reviewed here also pose some issues for exploration. Two investigators (James 1967, Sase 1969) have accepted 4 years as the lower age limit of the scale for their tentative norms. It is customary to calculate norms on groups of confident application and to extrapolate them for lower and upper age-groups (Goodenough, 1926, Harris, 1963, Phatak, 1966). However, both

the investigators have observed 16% (15.7%) scorable drawings in the age-groups below 4 years. James who had the sample from better schools has noted 7 drawings, i.e., 14% as scorable in the age-group of 2 years 6 months to 3 years. Under the circumstances instead of extrapolating the calculated norms to age-groups younger than 4 years an attempt may be made to collect samples of scorable drawings from the younger groups of pre-primary schools and the possibility of differentiating their scorable drawings from the drawings of older group be explored. Such an insight into the performance of younger children might be helpful in determining the use of the scale for the full range of pre-school age, at least in the urban area.

As regards the upper age limit the observations of Sharma (1970) be cross-validated. The application of the scale upto 14 years of age appears to be confident with significant rising trend of the mean scores as the age increases. After the age of 14 years no consistent trend is observed. This phenomenon needs exploration which might help in fixing the upper age limit of the scale. As already noted the observed highest mean plus one standard deviation does not reach the maximum score of 61. This indicates the scope for further scoring by some group. Until now it has not been explored whether a human figure drawing scoring 61 is possible and if it is deliberately drawn what is the possibility of such a figure drawn as an expression of advanced concept of a human figure. In revising the Goodenough scale to extend it into adolescent years Harris has added some new points related to cognitive ability. How far these added items have contributed towards making the scale suited to adolescent years is not known. However such a possibility cannot be denied. Hence, a query might be raised about the inherent limitations of the present scale for age-groups beyond 14 years. If the mean scores of age-groups beyond 14 years decrease it would be also interesting to know how these drawings differ from those of lower age-groups scoring similarly. These are some of the issues suggested for exploration while undertaking to develop norms for larger age range.

The review of the three studies be concluded with the following observations.

1. The extension of the Phatak Scale of Draw-a-Man Test to age-groups 4 to 6 years and 10 to 14 years is supported by acceptable validity, reliability and objectivity of the scale.
2. Fresh norms on full range of 4 to 14 years be calculated on appropriate samples rather than doing some patch work of different studies.
3. Exploratory studies be planned with samples of age-groups of 2 years 6 months to 3 years 5 months, so as to cover the total range of pre-primary school age on Draw-a-Man Test.
4. Exploratory studies be also planned with drawings by children or adolescents beyond 14 years of age.

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Study of Raven's Standard Progressive Matrices Test (1956)

S. Narayana Rao

The author briefly reviews the work done by him for about 15 years with Raven's Standard Progressive Matrices (RSPM) Test at the Department of Psychology, Sri Venkateswara University, Tirupati, and also reports some of his findings.

A brief review of the work done for about a decade and a half at the Department of Psychology, Sri Venkateswara University, Tirupati, by the author with the Raven's Standard Progressive Matrices (RSPM) Test is given here and some of the findings are also reported.

There are certain basic features of the test which commend it for ready use in a variety of situations. The test is easy to administer, and the instructions are simple. It does not necessitate any elaborate arrangements to be made, for its administration. It is a non-verbal test and can be used with subjects (Ss) of all language and age-groups. As an indigenous test of comparable nature suitable for our needs is yet to be available, the RPM test is often found to be a good working alternative. Raven describes it as a non-verbal test useful for measuring intelligence of Ss above 6 years of age. It is described to be a good test of 'g' not only by its author, but also by Vernon and Parry (1949), Banks (1949), Westby (in Buros, 1945), Wall (in Buros, 1959), and Bortner (in Buros, 1959, 1965) have

generally commended it as a promising instrument in assessing mental ability.

I

During the period 1958-1962, Raven's Standard Progressive Matrices (RSPM) was employed as one of the predictor variables of academic achievement in the colleges of arts and sciences (Rao, 1962) and the colleges of engineering (Rao, 1963). The studies pointed to the conclusion that RSPM was as good as any other test of intelligence in predicting scholastic performance. Most studies elsewhere on this problem reported correlations whose median value was between .24—.40. The findings were generally in keeping with the conclusion that non-intellective factors play a more predominant part than intelligence in scholastic achievement (Rao, 1965, 1967).

II

The author used the RSPM to study the distribution of mental ability among the S.V. University students. The study covered a representative sample of 2,247 male Ss in the degree classes drawn from arts, science, commerce, engineering, agriculture and veterinary faculties. Norms for the RSPM suitable for collegiate population were published (Rao, 1967). Raven does not give norms for the age-group covered by this study. Hence no comparison could be made.

About this time, work with the RSPM was commenced in the high schools to assess mental ability of pupils in the age-group 10+ to 15+ years on a large scale. In this context several practical problems came to the fore. Foremost of all was that the test proved to be too long. Some pupils tended to spend as much as two hours of time on it. The school authorities were quite unhappy with the testing programme, as it entailed suspension or cancellation of a whole forenoon or afternoon session. Something had to be done to overcome the problem of saving time. This led to experimenting with the idea of the practicability of shortening the time required to take the test.

TABLE 1
Means and SDs of RSPM Scores for Different Collegiate Groups
 (Mean Age 18.10 Yrs., SD 1.202)

Group	N	Mean	SD	Percentile	Equivalents
B. E.	452	54.14	3.96	P ₉₀	54.31
B. A.	478	41.28	8.30	P ₇₅	
B. Com.	122	39.76	8.19		51.41
B. Ed.	219	42.84	8.51	P ₆₀	
B. Sc.	769	45.18	[7.82	P ₂₅	45.04
B. V. Sc. &					
B. Sc. Ag.	207	46.42	6.55	P ₁₀	40.83 29.65
Total Group	2,247	45.39	8.67		

The odd and even parts of the test were administered randomly to different groups of subjects along with the total test. The test was also administered as a speed test with a time limit of 40 minutes. The obtained results convincingly demonstrated that either the even or the odd half of the test (i.e., 30 items only) could be used instead of the total test of 60 items without adversely affecting the reliability of the test. (However, for purposes of individual counseling it was suggested that the total test should be used.) The results further indicated that in its present form, the RSPM should not be used as a speed test, if the reliability of the test should not be seriously eroded (Rao and Reddy, 1972).

III

The RSPM was administered to over 7,400 male subjects (high school and collegiate) during the period 1960-1968. There was a persistent demand by the test-users to find a method of shortening the time requirements of the test and also to explore the practicability of using it as a speed test without sacrificing its reliability to any significant degree. It was also reliably learnt that some industrial establishments were employing this test as a speed test in their pro-

TABLE 2

Means, SDs of RSPM Scores and r_s Between Performance in Two Sessions for Each Group of Subjects

Group	N	Condition	1st Day		Condition	2nd Day		r between the 1st & 2nd con- ditions
			M	SD		M	SD	
A	140	Even-half	17.35	5.33	Full test	35.89	9.54	.926
B	140	Full test	35.44	9.67	Even-half	17.50	5.46	.920
C	140	Odd-half	17.50	5.38	Full test	35.12	10.02	.935
D	140	Full test	35.49	10.18	Odd-half	17.65	5.67	.933
E	140	Even-half	17.36	5.17	Odd-half	18.18	4.96	.934
F	140	Odd-half	16.16	5.35	Even-half	17.42	4.93	.936
G	140	Full Test	35.49	9.87	Full test	36.87	10.37	.924
H	140	Full test (Speed 40 mts.)	27.33	8.39	Full test (Power)	37.69	10.18	.763
I	140	Full test (Power)	36.26	9.83	Full test (Speed 40 mts.)	28.16	8.14	.784

cedures of personnel selection. As the items of the test are not arranged in a graded order of difficulty, the method of using it as timed test would appear to yield results which are of doubtful utility. The test was not intended to be used as speed test by its author. However, in actual usage, the practicalities of the situation may strongly suggest recourse to some such practice. It was obvious that any change should be considered only after the necessary data were obtained and carefully examined. So as a first step, it was decided to item-analyse the test.

The examination of the test results indicated that there was a drop in the mean number of problems solved from Set A through Set C. There was not much of a difference between the means for the sets C and D and there was a significant drop in the number of items answered on Set E.

From out of the 7,400 answer sheets of RSPM, 1,000 answer sheets were chosen at random for performing item-analysis. The following indices were computed for each item.

- (a) The percentage of Ss passing;
- (b) The item difficulty or item variance;
- (c) The critical ratio; and
- (d) The chi-square.

$$X^2 = \frac{N (P_u - P_l)^2}{4 P Q} \quad \text{formula 15.6, P. 425.}$$

(Guilford Psychometric Methods, 1954, McGraw)

The last two were computed on the basis of upper 27% and lower 27% of the Ss.

p_u = per cent in the upper group

p_l = per cent in the lower group

P = per cent pass

Q = per cent failed

Only one item in Set A has item variance above .15; Set B has 4 items. Sets C and D have 6 each and Set E has 9 items with item variance above .15. This suggests that the items in the test are not homogenous.

Combining a number of criteria suitably, the order of items was modified. The test booklets were cut open and the items were re-

Item No.	% Right	Diff. Index	G.R.	X ²	Item No.	% Right	Diff. Index	G.R.	X ²
1	100	—	—	—	1	98.3	.0080	—	0.610
2	100	—	—	—	2	99.1	.0089	.0457	0.8108
3	100	—	—	—	3	98.5	.0049	.6420	0.7120
4	99.8	—	—	—	4	84.2	.1146	4.2500	4.0870
5	99.6	—	—	—	5	85.6	.1056	4.4810	4.2750
6	99.7	—	—	—	6	80.5	.1358	4.6520	4.6560
7	98.9	.0769	3.926	3.571	7	84.9	.1101	2.6720	2.4680
8	92.1	.0616	3.222	2.709	8	69.3	.1906	8.2810	8.1810
9	95.4	.0366	2.257	1.723	9	75.5	.1624	7.3030	7.2270
10	90.6	.0719	3.926	3.571	10	82.7	.1233	5.9110	5.8510
11	89.7	.0786	4.406	4.047	11	74.1	.1693	7.5800	7.4780
12	60.2	.2221	8.509	8.282	12	60.6	.2204	9.1910	9.0580
SET C									
1	94.7	.0437	2.185	1.783	1	93.8	.052	2.028	1.502
2	94.2	.0476	1.928	1.424	2	91.7	.0668	2.404	2.750
3	93.8	.0511	2.266	1.737	3	90.8	.0736	1.410	1.384
4	89.5	.1233	7.391	5.236	4	83.7	.1218	6.316	5.049
5	85.5	.0116	5.430	5.233	5	93.5	.0685	2.221	2.191
6	75.5	.1682	7.173	6.982	6	80.6	.1071	5.027	4.686
7	86.0	.1071	4.205	4.123	7	77.1	.1600	6.213	5.953
8	77.3	.1688	7.252	7.151	8	76.9	.1612	7.253	7.151
9	74.4	.1788	6.023	5.801	9	76.7	.1693	8.215	8.074
10	65.7	.2100	8.231	8.023	10	73.2	.1742	8.077	7.152
11	62.9	.2190	8.252	8.079	11	44.6	.2497	10.391	10.258
12	19.7	.2092	9.230	9.079	12	18.6	.2061	8.101	7.973
SET D									

TABLE 3—(Contd.)

	Set E				Diff. Index=Difficulty Index (Item variance) C. R.=Critical Ratio χ^2 =Chi-Square
1	86.7	.1025	4.404	4.047	
2	81.7	.1344	5.726	5.621	
3	82.4	.1303	6.124	6.003	
4	65.2	.2116	10.331	10.300	
5	69.6	.1952	9.908	9.902	
6	57.9	.2326	11.284	11.150	
7	53.8	.2408	10.564	10.465	
8	72.0	.2436	11.904	11.816	
9	55.6	.2375	11.725	11.629	
10	33.9	.2426	13.680	13.489	
11	17.9	.2075	8.749	8.598	
12	21.6	.2154	6.519	6.333	

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arranged. The number of choices for each item and the position of the correct choice were not altered in any way. After several try-outs, the following order of items was finally used as it was found quite satisfactory.

TABLE 4
The Rearranged Order of Items of RSPM

<i>Sl. No.</i>	<i>Item</i>	<i>Sl. No.</i>	<i>Item</i>	<i>Sl. No.</i>	<i>Item</i>
1	A1	21	A11	41	B11
2	A2	22	B7	42	D10
3	A3	23	B4	43	D9
4	A6	24	E1	44	B8
5	A4	25	D6	45	C10
6	A5	26	C7	46	E5
7	B1	27	B5	47	A12
8	B2	28	C5	48	C11
9	B3	29	D4	49	E4
10	C1	30	C4	50	B12
11	A9	31	B6	51	D11
12	C2	32	B10	52	C12
13	D1	33	E2	53	E6
14	C3	34	E3	54	E8
15	D2	35	D7	55	E12
16	A8	36	D8	56	E7
17	A7	37	C6	57	D12
18	D3	38	C8	58	E11
19	D5	39	B9	59	E9
20	A10	40	C9	60	E10

The experimental form of the rearranged test as above, was administered to 120 first and second year B.E. students and 100 non-professional students from degree classes. The students were grouped by random assignment to 12 and 10 groups respectively of 10 subjects each. Each group was assigned at random to one or the other condition of testing, so that 6 and 5 sub-groups from each category took the original test first and the rearranged version next. The administration of the original and rearranged version was counterbalanced for the remaining sub-groups. The two administrations were made with an interval of three days between them. The obtained results were correlated.

TABLE 5

Means, SDs and Correlations Between the Two Forms of the Test

Group	N	M	SD	M	SD	r
Professional	120	50.76	6.08	49.13	6.712	.922
Non-Professional	100	47.30	5.97	45.68	6.803	.903

The rearranged version comprising only 45 items was administered as speed test. The fifteen items omitted were A1, A2, A3, A4, A5, A6, A9, B1, B2, B3, C1, C2, C3, D1 and D2. The test was administered along with the original test as above to 50 professional and 50 non-professional students. The interval between the two administrations was three days. The administration of the test to the sub-groups was counterbalanced.

TABLE 6

Means, SDs and Correlation Between the Original and Shortened Rearranged Test

Group	N	M	SD	M	SD	r
Professional	50	51.63	5.723	34.40	6.07	.931
Non-Professional	50	46.82	6.022	28.67	5.91	.958

The shortened version was administered as speed test with a time limit of 35 minutes for completing the test.

Using the thousand answer sheets chosen randomly referred to above), the normal score composition for the different total scores was determined. For this purpose the responses of 69% (Mean \pm 1 SD) of the Normal Probability Curve of the subjects were taken as the standard.

The normal score composition of the total score of a subject is necessary to determine the discrepancies in the subject's performance which affect the reliability of his score. A discrepancy score of 5 or above indicates that the score is unreliable. A second administration should be made. If the discrepancy score is between the

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TABLE 7
Total Score and the Normal Score Composition

<i>Total Score</i>	<i>Expected</i>		<i>Sub-Scores</i>			<i>Total Score</i>	<i>Expected</i>		<i>Sub-Scores</i>		
	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
32	10	9	7	5	1	46	12	11	9	9	5
33	11	9	7	5	1	47	12	11	9	9	6
34	11	9	7	6	1	48	12	11	10	9	6
35	11	0	8	6	1	49	12	11	10	9	7
36	11	0	8	6	2	50	12	11	10	10	7
37	11	10	8	6	2	51	12	11	11	10	7
38	11	10	9	6	2	52	12	12	11	10	7
39	11	10	9	6	3	53	12	12	11	10	8
40	11	11	9	6	3	54	12	12	12	10	8
41	11	11	9	7	3	55	12	12	12	11	8
42	11	11	9	7	4	56	12	12	12	11	9
43	11	11	9	8	4	57	12	12	12	11	10
44	12	11	9	8	4	58	12	12	12	12	10
45	12	11	9	8	5	59	12	12	12	12	11

3 and 5, the performance is acceptable, but not very satisfactory. If the discrepancy score is less than 3, the subject's performance may be taken as quite satisfactory and reliable.

In addition to obtaining a quantitative score on each of the sub-sets and a total score, the errors could also be qualitatively analyzed. The table below presents the qualitative analysis of the errors made by the Ss.

- A. Wrongly oriented.
- B. Wrongly oriented and incomplete.
- C. Irrelevant.
- D. Introduction of superfluous details misled the subject.
- E. Incomplete correlate.
- F. Perseverance.
- G. Reversal.
- H. Correct choice.

Table 8 shows that most of the errors of the Ss can be classified into one of the seven categories. The most frequent type of errors made was found to be caused by "wrong orientation" or "wrong orientation and incomplete" resolution of the problem.

Perceptual ability is important in the first two sets of the test

TABLE 8
Types of Response Made in Choosing the Answer for Each Item

Set—A												
Choices of Out-Out	7		8		9		10		11		12	
1	B		E		R		C		D		B	
2	B		E		D		A		A		B	
3	C		E		D		R		B		C	
4	D		B		A		D		R		F	
5	G		D		E		A		B		F	
6	R		E		A		D		D		F	
7	—		—		—		—		—		—	
8	—		—		—		—		—		—	
Set—B												
Choices of Out-Out	1	2	3	4	5	6	7	8	9	10	11	12
1	O	D	R	E	R	A	A	A	F	F	D	E
2	R	D	E	R	C	A	F	A	B	F	F	F
3	C	D	D	C	A	R	A	F	B	R	R	B
4	C	E	D	A	A	F	A	F	B	E	F	A
5	D	D	D	C	P	A	R	F	F	D	D	R
6	D	R	A	C	D	D	A	R	A	A	F	D
7	—	—	—	—	—	—	—	—	—	—	—	—
8	—	—	—	—	—	—	—	—	—	—	—	—
Set—C												
Choices of Out-Out	1	2	3	4	5	6	7	8	9	10	11	12
1	E	A	D	E	E	A	A	R	B	F	R	F
2	D	R	B	E	D	C	A	C	B	C	A	R
3	F	B	B	E	F	A	A	B	F	D	G	C
4	E	D	E	E	F	R	A	B	C	C	C	D
5	B	C	E	E	D	A	C	C	F	B	B	E
6	B	E	F	E	B	C	R	O	D	R	F	D
7	B	F	C	O	R	C	A	B	D	C	C	C
8	R	C	B	R	F	D	A	B	F	D	D	C

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Set—D

Choice of Out- Out	1	2	3	4	5	6	7	8	9	10	11	12
1	D	D	B	F	C	A	A	A	R	A	F	A
2	C	F	D	F	C	F	F	A	A	R	A	B
3	R	F	R	B	C	A	F	F	B	B	A	C
4	F	R	F	C	F	A	A	R	F	O	F	A
5	D	C	E	E	C	D	R	D	A	D	R	D
6	C	C	C	F	D	R	C	F	F	F	D	R
7	C	C	C	R	C	C	C	A	F	A	A	D
8	C	C	C	D	R	A	A	F	F	A	B	A

Set—E

Choice of Out- Out	1	2	3	4	5	6	7	8	9	10	11	12
1	F	D	F	F	R	A	R	D	D	A	D	D
2	B	F	A	R	A	F	F	D	D	R	C	C
3	C	C	F	D	A	F	F	B	D	C	B	D
4	F	D	C	C	C	D	A	B	D	C	R	F
5	C	A	D	F	F	R	D	F	D	C	C	R
6	D	R	D	F	F	F	A	R	C	F	C	C
7	R	F	C	F	C	D	A	C	D	D	C	C
8	B	C	R	C	D	D	A	D	D	F	B	D

The wrong answers given by the Ss often indicate a faulty perception of the figure-ground configuration. In Set B the attitude of the Ss appears to be more analytical. Often the incorrect answers in this set and in the following sets indicate that the Ss tend to work the solution in certain fixed special directions. Unlike the Sets A and B, Sets C and D require more complex type of activity on the part of the Ss. On Set E it is common for the Ss to reach their solutions by employing analytical and algebraical approaches.

The Shortened Rearranged Test could be administered as a speed test with a time limit of 35 minutes. The standard procedure employed in the try-outs was to instruct the Ss to answer items A9, C2, D1, C3 and D2 in that order and explain the difficulties, if any, before the Ss were permitted to proceed on their own. It was ensured that

the Ss completely and fully understood the instructions.

All questions posed and doubts raised by the Ss were explained and they were then asked to proceed on their own. The time was reckoned from this point. In all group administrations it was found necessary to keep the size of the groups well under 20, not only for administrative convenience, but more so, to enhance the reliability of Ss scores. The retest reliability of the test administered within two weeks was found to be .935 for a group of 50 Ss (collegiate). The reliability of the test was found to be slightly improved if it was administered as a power test. The r was .952 for a group of 50 Ss (collegiate). The test as adapted above, was found to be convenient and to serve our requirements of a good instrument for assessing mental ability. As the school periods are of 45 mts.' duration, the test could be administered within a class period, as it does not require detention of Ss beyond a single class period of 45 mts.' duration.

Validity of the Test

From Table 1 it would be seen that the distribution of the scores of RSPM for the different groups of Ss was significantly different. The mean for B.E. group was 54.14; B.Sc. 45.18; while the mean for B.A. was 41.28; B.Com. 39.76. The engineering students, and to some extent the science students, are known to be more able and they comprise the few students who are selected in terms of their ability to pursue these courses in preference to others. From the results obtained with different groups of students known to differ with regard to their abilities, the validity of the RSPM could be inferred.

Other Findings with RSPM

1. As a predictive variable in scholastic achievement, RSPM was found to be useful if it was combined with other variables like past-achievement or arts and science students and first term performance of engineering students. Considered by itself, RSPM was a poor predictor of scholastic achievement.

The RSPM scores failed to discriminate between the high from

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TABLE 9
RSPM Scores Compared with Achievement Scores of High and Low Achieving Groups

Group	N	RSPM M	Scores SD	Achievement Scores M	SD
High Scorers	106	53.28	3.04	18.32	3.02
Low Scorers	106	51.37	3.87	2.48	1.32

the low academic achievers. When past performance of the Ss was equated the following results were obtained.

TABLE 10
RSPM, Ma and SDs for the Two Groups when Past Performance was Equated

Group	N	M	SD	Group	N	M	SD
Professional (OAs)	43	55.53	2.71	Non-Professional (OAs)	46	49.61	4.02
Professional (UAs)	62	54.87	3.43	Non-Professional (UAs)	63	48.63	4.98

OAs=Over-achievers; UAs=Under-achievers.

The correlation between achievement and RSPM scores was .368 in the case of professional students and .303 in the case of non-professional students at the collegiate level.

With the Minnesota Paper Form Board (Forms AA & BB) the RSPM does not yield a high correlation.

TABLE 11
The Correlation Between RSPM and MPFB (Forms AA&BB) for Different Groups of Ss

Group	N	r Between MPFB & RSPM
Junior Tech. School	220	.315
Polytechnic	900	.283
B. E.	824	.280

Occupational choices and mental ability as assessed by RSPM were found to be significantly related. High ability Ss make their occupational choices earlier than their counterparts with low ability. They also tend to choose higher level occupations. The obtained χ^2 values for df 30 were significant at .01 level.

Major Findings and Conclusions

1. Raven's Standard Progressive Matrices Test cannot be considered as a culture-free test. The norms for the British subjects provided by Raven differ markedly from those obtained with the Indian Ss in this area as well as in other areas in India.
2. The RSPM test can be used as a short test to save time on administration either by using the odd or even half of the test. This does not seriously affect the reliability of the test scores. However, for purposes of counselling, the full test should be used without any time restriction as a power test.
3. The RSPM Test cannot be used as a timed test or speed test in its present form as the items in the test are not arranged in graded order of difficulty.
4. Item analysis of the test indicated the need for, and usefulness of, rearranging the items of the test in a more effective order.
5. The rearranged test could be used as a speed test with 45 minutes as the time limit.
6. A shortened version of the rearranged test comprising 45 items instead of 60 items could be used with a time limit of 35 minutes without seriously affecting the reliability of the test.
7. In order to improve the utility of the test for counselling purposes, it would be necessary to examine the errors of the subjects as well as the discrepancy scores of the Ss.
8. Raven considers a test score unreliable if the discrepancy value was 3 or more. The normal score composition on each of the Sets A, B, C, etc., for the different total scores with the original test was determined for the Indian population. This could be of help in interpreting the scores obtained by the Ss.
9. The RSPM Test does not hold much promise as a predictive

instrument in predicting scholastic achievement. The correlation between RSPM scores and academic achievement was between .226-.368. The test does not distinguish high achievers from low achievers.

10. The correlation between RSPM and MPFB was rather low. It varied between .260-.315 for different groups of Ss.

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BOOK REVIEWS

Reading Comprehension Education

Reading Comprehension Education in Fifteen Countries International Studies in Evaluation—III

Robert D. Thorndike, published in English by John Wiley & Sons, New York—London—Sydney—Toronto, 1973, Almqvist & Wiksell, Stockholm.

The importance of reading in the educative process of the child need not be emphasized. Reading is one of the most important aspects of language arts and one of the effective means of communication. For a young child it is an extension of his early language abilities. In other words reading illumines the child's experiences.

Realizing the importance of reading it has always been given due place in the school curriculum, particularly at the elementary level. It is regarded that reading is unique among school activities in being both a subject of instruction and a tool for the mastery of other phases of the curriculum.

It is a common experience of teachers that poor readers repeat grades and a successive failure on their part results in frustration and compel them to leave school. It is, therefore, natural to believe that proficiency in reading is closely related to school success.

As far back as in nineteen thirties some research studies were conducted to determine the relationship between reading ability and general scholarship.

"An investigation by Lee¹ demonstrated clearly the importance of reading for general scholarship in elementary school. Six tests of reading ability were given to pupils in the fourth, fifth, and sixth grades, and the results were correlated with an achievement score obtained from the Modern School Achievement Tests. (In getting this score, the reading sections of the tests were omitted.) Even after the influence of intelligence was eliminated, substantial relationships between reading and general achievement remained. From her results Lee concluded that read-

¹Lee, Dorris M. The Importance of Reading for Achieving in Grades 4, 5 and 6, *Contributions to Education*, No. 566, New York: Bureau of Publications, Teachers College, Columbia University, 1933.

ing ability of fourth-grade level is a minimum requirement for satisfactory work in these grades."

Reading ability is important for scholarship in secondary school as well as in elementary school. "This has been clearly shown in a careful study by Bond." She gave a number of reading tests and also standardized achievement tests in all subjects to three hundred ninth-grade pupils. A suitable statistical method was used to make sure that the results were not influenced by differences in age or intelligence. General reading comprehension was found to be significantly related to average scholarship and to all separate subjects except mathematics. Evidence was also obtained that the reading abilities essential to achievement differed considerably from one subject to another. For instance, fast readers excelled slow readers in tests of vocabulary and literary acquaintance, but the slow readers had a slight advantage in general science, spelling, and mathematics. Bond concluded that there is a definite need for teachers of the content subjects to instruct their pupils in the particular reading skills that are important in the study of their subjects."

The findings of the research study by Leo C. Fay indicate that there is a fairly good relationship between reading ability and other school subjects." Much of the reading is done by children in different subject fields in addition to basic reading instruction stressing vocabulary growth and the development of various comprehension abilities. This study suggests that the teacher must help the children to develop differentiated ways of reading depending upon materials and purposes.

Bond and Wagner⁴ have summarized some of the difficulties made in reading in the field of social studies and other content subjects. For example, they have listed and described the following main adjustments needed in reading social studies materials.

³Bond, Reading and Ninth-Grade Achievement, *Contributions to Education*, No. 756, New York: Bureau of Publications, Teachers College, Columbia University, 1938.

⁴Leo C. Fay, "The Relationship between Specific Reading Skills and Selected Areas of Sixth Grade Achievement," *Journal of Educational Research*, Vol. 43, pp. 541-547, March 1950.

⁵Guy L. Bond & Eva Wagner, *Teaching the Child to Read*, 3rd ed., New York: Macmillan, 1960.

1. Adjustment to Vocabulary
2. Adjustment to Complexity of Ideas
3. Difficulties of Locating Supplementary Materials
4. Adjustment to Organisation
5. Difficulties of Reading Critically
6. Understanding the Conditions and Modes of a particular Period.
7. Using Current Materials

These research studies and a score of such other studies have revealed that there is an impact of reading in the achievement of pupils in different school subjects. From these studies people could realise that reading does not mean only deciphering but it is a thinking process and a meaningful experience.

Various studies have been conducted in several countries to determine the reading interests and attainment level of children. Vocabulary studies have been conducted to determine the minimum vocabulary of children in different grades. Large number of reading tests including reading readiness tests, achievement tests and diagnostic tests have been prepared by several agencies and institutions in the different countries of the world.^a

In India a study has been launched by the National Council of Educational Research and Training, New Delhi for determining the impact of reading in the achievement of pupils in different school subjects. The three major objectives of this study are as given below:

- I. Preparation of Vocabulary lists for children from Class I to V in Hindi.
- II. Construction and standardisation of reading tests for children from Class I to V in Hindi.
- III. Determining the impact of reading ability in the achievement of pupils in different school subjects.

The spoken and written vocabulary has been collected in 24 dialectic areas. For this purpose 120 schools, 120 teachers and 2,400 children were involved. As regards the reading vocabulary, textbooks in Hindi, Social Studies, Science, Arithmetic and Home Science of the Hindi speaking states of the country were analysed. The data

^aA brief description of such studies and tests in reading has been given by the reviewer in *Indian Educational Review*, Vol. 2, No. 1, January 1967.

has been analysed and is being used for the preparation of the reading tests. Pilot reading tests for Classes I and II have been prepared. The work is continued. It is expected that this study will reveal the impact of reading in the achievement of pupils in the age-group 6-11 years (approximately).

Although different countries of the world have conducted research studies for determining the impact of reading achievement of pupils in different school subjects, yet hardly any attempt had been made to compare the reading abilities of the children of the different countries of the world.

It is heartening to note that for the first time the International Association for the Evaluation of Educational Achievement (IEA) has undertaken a research study to determine the reading comprehension education in 15 countries of the world.

The International Association for the Evaluation of Educational Achievement decided in 1966 to launch an international study of reading comprehension as a part of its six-subject survey. The report of this survey has been published in the year 1973.

This study has been conducted in 15 countries with thirteen different languages of instructions. These countries are Belgium, (Fl), Belgium (Fr), Chile, England, Finland, Hungary, India, Iran, Israel, Italy, Netherlands, Scotland, Sweden, the United States and New Zealand.

This study has been conducted to examine the socio-economic, cultural and educational factors related to achievement in learning to read and comprehend the mother tongue. In fact, the most interested cross-national comparisons related to learning to read are comparisons of progress made during the first years of elementary school. At this age-group, the basic decoding processes are establishment and in which the equivalence between the oral language and the written symbolism is mastered by the learners. However, because of some particular difficulties for empirical cross-national studies with 7-or-8-year-old children, the IEA decided to conduct this study for the 10-year-olds and 14-year-olds, and those in the final year of secondary education. Secondly, the IEA wanted to fit the testing of reading into the same framework that was used for testing science, literature, civic education, and English and French as foreign languages. From this

it may be seen that this study leaves scope for some international study in beginning reading.

Initial planning for the study of accomplishment in reading comprehension in different countries was undertaken at a meeting of the IEA in November, 1966, and much of the detail was worked out at a week-long meeting in June 1967. After that, operational steps for preparing and reviewing test items and assembling final forms of the test work were carried out largely by mail.

The testing was limited to reading comprehension test of the functional type in which a passage is presented together with multiple-choice questions based upon it, the examinee reads the passage and then attempts to answer the questions referring back to the passage as and when he finds it necessary. The comprehension test was supplemented by a brief test of reading speed. The format of this test consisted of a series of short, simple paragraphs, each ending in a multiple-choice question to be marked by the examinee. A further supplemental test was a brief test of word knowledge presented in the form of word pairs, each to be identified as synonyms or antonyms. A number of passages that seemed to the members of the international committee to be suitable in style and content and not to be peculiar to any one culture or country, were selected as possible material for the test. These passages were reproduced and circulated to all the countries for comment. Only those passages that were almost universally considered to be acceptable for inclusion were retained for further development.

The IEA was conscious of the formidable translation problems. However, care was taken to maintain as nearly enough the task from one language to another to make the cross-national comparison interesting and fruitful in this study on reading.

Test development was carried out during 1967 and the tests were distributed for tryout around March 1968. The tryouts were completed before the end of school year 1967-68.

Analysis of the tryout data was carried out by each national centre that had participated in the pre-testing and the results were sent in to be centrally collected for each of the reading passages. The collected data were circulated for review by the International Reading Committee, and on the basis of recommendations received

from the members, the test editors made the final selection of passages and items.

Passages were selected to provide a suitable range of difficulty for the population in question. A second consideration in selection of passages was the number and diversity of items showing suitable difficulty and discrimination.

The final tests were prepared as follows: For Population I (10 years olds) two tests each planned to have a time allowance of 25 minutes, each composed of 4 passages and including jointly a total of 45 items; for Population II (14 years olds) two tests each planned to have a time allowance of 45 minutes including jointly eight passages and total of 52 items, and for Population IV (end of secondary school) two tests each planned to have a time allowance of 50 minutes including jointly eight passages and a total of 54 items.

The test items showed a widespread difficulty. Median per cent of correct answers, pooling the results for all the countries was 49.4 for Population I, 58.7 for Population II and 59.6 for Population IV. For Population I, the test appears to have been somewhat too hard, but for the other two populations the difficulty was about what one would wish to obtain for effective measurement. However, in the three developing countries (Chile, India and Iran) the test tasks were clearly too difficult.

In general, the test items discriminated satisfactorily between good and poor readers. Overall median of the point-biserial correlations between item and total test was 0.38 for Population I, 0.34 for Population II, and 0.29 for Population IV. For determining the reliability of the tests both the Kuder-Richardson Formula and Alternate Form Method were used. The correlation obtained through Alternate Form Method was corrected by using Spearman-Brown Prophecy Formula.

The coefficient of reliability for reading comprehension test falls between 0.75 and 0.85 in most of the countries. The reliability coefficient for the word knowledge tests was also found high. In most of the cases it was found more than 0.80. In the case of speed of reading comprehension test, the only way in which a meaningful estimate of reliability could be obtained was to give two separately timed tests to groups of examinees and obtain the correlation between

the two forms. Using the second form as alternate form, the reliability coefficient of the tests was obtained to be more than 0.8 in the majority of the cases.

The other main section of data gathering was based on questionnaires to be completed by each student tested, by a sample of teachers in each school and by an administrative representative for the school. Items to be included in the questionnaires were submitted by each of the subject matter committees and by concerned general committee concerned with hypotheses to be investigated in the six-subject study. Some of the questions were of a sort for which the options were obvious. There were others, however, for which it was difficult to tell in advance what range of responses would be received and how these should be divided into response categories in a precoded questionnaire.

The preliminary forms of the questionnaires were circulated to national centres for review and were revised on the basis of suggestions from this source. Final forms were then prepared and distributed for translation and use.

There had been some difficulty regarding the accuracy of response in regard to the 10-year-olds. Some preliminary studies were made of accuracy of responding by the child, using factual items and checking his response against information from independent source. Results from these studies were generally encouraging. However, it has been realised that the studies did not focus upon those children who had difficulty with reading, nor upon those countries where reading skills were least well developed. In the teacher and the school questionnaires, the limitation appears to focus more on the relevance of bits of information that it was possible to obtain to the issue which were desired to be studied.

After analysing the test scores and the filled-in questionnaires received from the participating countries, suitable statistical procedures were used for analysing the data and drawing conclusions. The following are some of the significant findings and conclusions of this study.

1. It has been found that information about characteristics of the home and community environment in which a youngster has grown up permits a fairly good prediction of his achieve-

- ment in reading at the age of 10 and at the age of 14. The prediction is less effective at the end of secondary education.
2. In the 10-year old group, placement in type of school seems to be of no great importance as predictor. However, with the 14-year-olds in many countries a very substantial part of the variation in reading achievement is represented by the type of school or type of programme in which the individual is placed.
 3. The study reveals that the better reader reads more in such areas as current events, science, philosophy and even humour and reads less in the fields of romance and adventure. The better reader plans to continue his education and aspires to a higher level of occupation in the future. He has certain attitudes that differentiate him, the one that is the most clear-cut in the evidence available being a belief in the importance and value of science for human affairs.
 4. The means and standard deviations by country for reading and word knowledge tests have been calculated. Table I on p. 201 gives the value of means and standard deviations for each of the participating country.

From the table it may be seen that the dramatic finding of this study is that there is a very large difference in reading level between the developed and development countries. It has also been found that within a group of developed countries the differences are fairly modest, and the rank order shifts from one age-group to another. However, with complete consistency, the three developing countries fall far below those who have a relatively high level of economic development and a long standing tradition of universal education. The differences are so large that by the standards of developed countries, the 14-year-olds in the developing countries seem almost illiterate.

5. The study shows that there is a high correlation between science and reading comprehension. The median correlation in this case is 0.68. The correlation between science and word knowledge is comparatively lower than the correlation

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between science and reading comprehension. It has been found that the correlation between science and world knowledge is 0.57. The correlation between reading comprehension and word knowledge is 0.59. The correlation between science and reading speed is low. Similarly the correlation between reading speed and word knowledge is low. The correlation between reading comprehension and reading speed is also low.

The following table indicates the correlations between the scores of individual students in the 15 countries.

TABLE 2

Correlation Between Science, Reading Comprehension, Reading Speed and Word Knowledge of Individual Students

Country	Science Vs. Reading Compre- hension	Science Vs. Reading Speed	Science Vs. World Know- ledge	Reading Compre- hension vs. Reading Speed	Reading Compre- hension vs. Word Know- ledge	Reading Speed vs. Word Know- ledge
Belgium (F I)	.60	.29.0	.505	.36	.54	.32
Belgium (Fr)	.66	.32	.57	.32	.59	.16
Chile	.62	.26	.46	.29	.54	.29
England	.77	.37	.70	.47	.74	.42
Finland	.71	.32	.58	.36	.62	.27
Hungary	.63	.26	.56	.33	.59	.24
India	.64	.15	.62	.14	.57	.15
Iran	.60	— .03	.46	— .03	.50	— .11
Israel	—	—	—	.32	.65	.25
Italy	.68	.10	.53	.08	.58	.06
Netherlands	.70	.24	.69	.33	.62	.26
Scotland	.76	.39	.70	.48	.72	.44
Sweden	.72	.32	.55	.37	.56	.29
United States	.77	.27	.71	.31	.74	.34
Median	.68	.27	.57	.33	.59	.27

- Statistical analysis has been done to study how far comprehension, word knowledge, reading speed and other content subject can predict science and literature. The weights and multiple correlations as determined through this analysis are shown below.

READING COMPREHENSION
EDUCATION

	<i>Science</i>	<i>Literature</i>
Reading Comprehension	0.52	0.58
Word Knowledge	0.18	0.14
Reading Speed	—0.01	0.00
Other Content Subject	—0.02	—0.02
Multiple R	0.61	0.69

The results indicate quite clearly that the prediction of either literature or science is mediated almost entirely by Reading Comprehension Test and that only a small additional prediction is made possible by the addition of world knowledge, reading speed or the other subject matter area.

7. The regression analysis for predicting science and literature from other variables gives the following weights and multiple correlations.

	<i>Science</i>	<i>Literature</i>
Reading Comprehension	0.38	0.46
Word Knowledge	0.12	0.14
Other Content Subject	0.04	0.03
Multiple R	0.46	0.56

From the above, it may be seen, that although the correlations are substantially smaller, the general pattern is not changed in that most of the predictability is provided by the Reading Test, a little additional amount is accounted for the word knowledge measure, and essentially none by the other subject matter score.

8. In the developed countries an appreciable prediction of the reading achievement of individual students—and an even more substantial prediction of the average reading achievement of children in a school—is provided by information about their home and family backgrounds. A dominant determiner of the outcome from a school in terms of reading performance is the input in terms of the kinds of students that go to the school. When the population of a school comes from homes in which the parents are themselves well educated, economically advantaged, and able to provide an environment in which reading materials and communications media are available, the school shows a generally superior level of reading achievement.

This study has been the first of its own kind in the field of reading which examines the socio-economic, cultural and educational factors related to achievement in learning to read and comprehend the mother tongue. At times it is hard to believe that the reading achievement of children of different nations could be compared because of language and cultural variations. By using the most appropriate statistical techniques, this study has not only made a contribution by way of comparing the reading achievements of children of 15 nations with 13 different languages but has also established that statistical procedures have advanced to such an extent that by their proper use comparability of achievement under variable conditions are possible.

This study is of special significance for developing countries where reading achievements have been found considerably lower than those of the reading achievements in developed countries. Improving the reading achievements of children in the developing countries becomes a matter of more significance because this study has revealed that reading achievement has high correlation with science which occupies a special place in the school curriculum in this scientific age.

Due to certain limitations, this study could not include the children in the age-group 6 to 9 years which is the crucial stage for beginning reading. One would look forward for such a study in the near future which may be still more revealing than the present study.

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The Democratization of Education

Present Problems in the Democratization of Secondary and Higher Education

A. Le Gall, *et al.*, Unesco, Paris 1973 (pp. 238)

Among the major essential bases for the successful working of a democracy, provision of equality of opportunity is one. This concept of "equality of opportunity" extends itself to all fields—social, economic and political. When it is extended to education, it is known as "equality of opportunity in education." Democratization of education refers both to the ideal of "equality of opportunity in education" as well as to the process through which the ideal is achieved.

As an ideal, the concept generally means two things: (1) All should get education without discrimination. This refers to equality of access in education. (2) Each should be given opportunity according to talents and capacity. This, among other things, refers to the sanctity of individual freedom, and his capabilities and drives. As a process, the concept has often meant the following five things:

1. Provision of free and compulsory education up to a given age level.
2. Increasing this age level progressively in accordance with the "means" and "will" of a country.
3. Providing common curriculum and, if possible, a common school system.
4. Provision of additional facilities of education on the basis of talents and individual merit.
5. Location of other factors of differentiation and their removal.

The first three items out of the five described above, provide what can be described as "minimum desirable equality of opportunity in education."

In under-developed and developing countries where primary education has yet to be universalized, even this minimum equality of opportunity in education is a far cry. Although some of them do

claim to be making efforts to provide special facilities for the talented also, the distance they have yet to traverse to achieve this minimum equality is great.

However, for developed countries which appear to have achieved the stage of "minimum equality of opportunity" in education, and have also, more or less, achieved the target of enrolling virtually all children of the secondary stage age-group, there are further visions of better democratization of education, especially at the secondary and university stage.

These visions often revolve around the fourth and fifth items enumerated above and involve fundamental socio-political issues of equality and freedom, two vital parts of the process of democratization of education.

On these fundamental issues, often two extreme views have been expressed. One view, based upon tradition and considered sound democratically, is that "innate differences" in the individuals should be respected and the society should not put restrictions in any way to hamper the growth of individuals. This is, by and large, the opinion of those who believe in the "freedom-dominated democracy".

Numerous objections are raised against this view. The major among them relates to the position and demands of the society vis-a-vis individual. Moreover, it is also felt that a single system or even a few systems of education in a country are not sufficient to help the achievement of the ideal in its absoluteness. Theoretically speaking there should be as many systems of education as there are individuals as each individual is unique in himself.

The second extreme opinion is expressed by the champions of "equality-dominated democracy". They contest bitterly the above position and consider it against the principle of social equality and democracy. They take the extreme view that not only those factors in the society which create differentiations should be removed for the democratization of education, but even the "innate differences" in the individuals should also be changed according to the moulds of the society.

As in case of the first view, there are objections against this second extreme view also. It is pointed out that wherever experiment on this extreme view has been performed, new forms of differ-

entiations emerged with the passage of time, and those in power developed a vested interest in maintaining a *status quo* permitting those differentiations. In fact educational system has often been used to defend the new *status quo*.

The above-stated views are extreme views, and perhaps while they help to solve some problems, they also create new problems related to democratization of education.

The real problem of democratization is that while the "inequalities" in the educational system are reduced to the minimum, the freedom of the individual initiative and drive is also maintained. The possible solution lies in striking a balance between the two extreme views. A "middle path", as the book describes it, has to be found out. It can be done by respecting the innate differences among individuals through freedom of choices and options in education on a large scale, on the one hand, and by removing or narrowing down the causes and factors of differentiations inherent in the social and educational system themselves, on the other.

Most of the formal systems of education, it is admitted on all hands on the basis of experience, perpetuate differentiation in a very marked way. They are perpetuated not only on the basis of the existing socio-economic background of the students, but also on the more deadly basis of educational structures themselves. The need as such in every country is not only to remove the practical socio-economic causes of differentiations but also to make a thorough study of the structures and functions of the educational systems and locate the various areas of differentiation.

On the basis of the studies suggested above and with a clear perception of the idea of democratization, the systems of education can be reshaped. Entirely new frameworks of education can be created which take into consideration the middle path. Reshaping of educational structures for more democratization of education presents numerous problems at the secondary and university level. The problems range from methods of teaching, admission procedures, to such things as scholarships, study grants, etc.

Unesco has done a great service to humanity in regard to the democratization of education. First, it developed pinpointedly the very concept of equality of opportunity in education. Then it made

numerous efforts both in practice and through literature "to arouse sensitivity in responsible educational circles concerning the problems of democratization".

The present publication by Unesco is one of such publications which deals with the above-stated numerous problems of democratization both at the secondary and university level. It is a collection of three studies prepared by different authors, united by a common theme of democratization of education at the secondary and higher level. The three studies pinpoint different factors responsible for differentiations, and recommend solutions for their removal.

The first study has been carried out by A le Gall, Inspector-General, Ministère de l'Éducation Nationale, Paris. The main theme of this study relates to the nature of functional and structural differentiations at the secondary and higher level and their implications for the democratization. It rejects the rather over-simplified idea, as in fact the whole book does, that "the democratization of higher and secondary education is achieved once such education is made available to the greatest possible number." It admits that although "equality of access" and prevention of "dropouts" and "repetition" are still the two foundation stones on which the whole edifice of democratization of education stands. But there are areas which create what the study describes as "unwarranted differentiations". To know them and to deal with them effectively is the real problem of democratization.

The study lays its hands on numerous structural and functional factors at lower secondary, upper secondary and university stage. It presents data from various countries, and also from various social and professional groups to point out numerous factors which cause differentiations. The standards of living, wastage and stagnation at primary schools, are only a few of the causes which create differentiations at secondary level. At the lower and upper secondary level, a whole gamut of causes like selection procedures, curricula, methods of teaching, state assistance, etc., cause differentiations. At the higher level "restricted" and "planned" systems of education on the one hand and "open systems" on the other present their own factors which create differentiations. Furthermore, if the concept of life-long education is accepted, there is bound to be life-long struggle

against differentiations also. The study devotes a full chapter to this problem.

The study comes to the general conclusion that if any worthwhile democratization in education has to be achieved, it can be achieved "through a whole series of financial, political, sociological and psychological measures." To the reviewer, it is an announcement of the fact that the ideal is one of the most difficult to be achieved.

The study recommends the modification of school and university structures with two possible ends in view. One, to level them so that "they are no longer comparable to a kind of murderous steeplechase" (p. 140). Two, to make them accessible to greatest possible number of students and not to introduce, until the last possible moment, procedures meant to exclude certain categories of students from education.

The above-stated structural reform should be accompanied by a corresponding functional reform. To quote from the text:

This would consist of freeing schools and universities, at least partially from their anachronistic slavery to examinations, ensuring that pupils and students can lead a normal life from the material personal point of view through a system of study grants, both extensive and exacting and free from any pressure concerning their choice of subjects; and finally directing training towards a broad intellectual and educational outlook which, while abandoning excessive specialization, would give preference to multi-disciplinary studies. These would meet the aspirations of young minds, would satisfy employers and be in line with the trends of modern knowledge towards convergence and synthesis (p. 140).

The second study has been carried out by J. A. Lauwerys, Director of the Atlantic Education Institute, Halifax, and his colleagues, B. Holmes and A.B. Dryland. The study is related to those developed countries which have, more or less, achieved the target of enrolling virtually all children of secondary stage age-group in schools. It concerns itself with two aspects, namely, the democratization of secondary education, and the influence of this democratization at the secondary level, on the democratization of university education. The study starts with a consciousness that policy decisions at the primary level have deeper implication for democratization of education at secondary level, than policy decision at the secondary level have for the

democratization of education the university level. However, the study does not pay much attention to the first, for it does not study processes of democratization of education in those countries where universal first-level education has yet to become a full reality.

A political "will" to take policy decisions about democratization, abundance of economic resources to implement those decisions, and competence of the administrators and grassroot workers, that is, teachers, are the prior conditions for the success of any programme of democratization. A fourth factor which can often hamper the implementation of the accepted policy is "cultural-resistance" in groups which has not been shown due consideration in the introduction to this study.

The study deals with the "key factors" which help democratization of education or hamper it. Chapters II to VI of the study are devoted to the evaluation of such factors as generally lie in the internal organisation of the school, and generally result from the rising school-leaving age on the one hand and increasing attendance on the others. Chapters VII to IX are devoted to supplementary agencies which can help in the process of democratization. It means that those who left the school due to certain reasons but wish to continue their education now, may be provided with certain educational alternatives to educate themselves while living away from the formal education systems. This is strictly in line with the principle of "equality of opportunity in education". Correspondence courses can be one way of doing that. There can be others such as mass media, etc. In this study, there are recommendations after each chapter which can be useful for those countries specially which have achieved the "universalization of secondary education."

The third study has been carried out by S. Mattsson, of the Ministry of Education, Stockholm. It concentrates in the "State Study Assistance" in Sweden and other Scandinavian countries and its implications for democratization of education. The study is divided into ten chapters. Chapter I is introductory and Chapters II, III and IV give in brief the historical background of the development of State study assistance in Sweden, as also certain information about the educational system and welfare reforms in Sweden. The next five chapters deal with the different aspects of State study

assistance including its organisation for education and its major implication for democratization of education. Chapter X studies this State assistance in the other Scandinavian countries.

The State assistance for education today forms the main plank of democratization of education at the secondary and post-secondary levels in these countries. Though the recruitment to higher education is still uneven, the State study assistance has gone a long way in helping the march of education in a democratic direction. The study is brief but illuminating. It shows that a right to this State study assistance at the secondary and post-secondary stage can be the single major step in the democratization of education.

The three studies mentioned above present a wealth of data for drawing evidences and conclusions. The data are drawn from most of the well-to-do countries. No doubt, they are as such highly useful for the developed countries. It is, however, doubtful that these studies can really be very useful for the under-developed and developing countries. Not only their socio-economic growth level is different, but the cultural problems also differ radically. Moreover, the structure of their educational systems are different and are not supported by a very large amount of finances from the public exchequer. At best, for these countries, the publication carries certain hints to achieve universalization of primary education. The study can also help these countries if they undertake a long-term planning on democratization of education.

The studies are welcome, nevertheless, for adding new consciousness about the various dimensions of democratization of education and the numerous factors responsible for the non-achievement of the ideal at secondary and university level. The book is indeed a very welcome addition to the existing literature on the problem.

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